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The End of a Familiar Inflation Accounting Cycle[1]

Michael Mumford

With the modest recommendations of the Hyde Report [1], persuasive in nature rather than mandatory and clearly a compromise version of earlier statements, we appear to be heading for the end of a 5-year cycle of events in British accounting which mirror very closely events which occurred about 25 years ago. The similarity is so marked, and the steps so predictable, that they are described below as a blueprint for the next surge of inflation.

Eight stages may be discerned. First there arises an increase in the rate of domestic inflation, accompanied by a fall in stock market prices. Next the profession responds. Then government intervenes, on the grounds that broader social issues are involved than the profession can embrace in its deliberations. Stage four sees the publication of 'radical' studies of accounting techniques, with strong proposals for reform. Not surprisingly, this leads to intense controversy within the profession. A compromise recommendation is put forward, but by this time inflation rates are past their worst (and the stock market has picked up again); and in the final stage, interest in reform dwindles.

These eight stages are described below in more detail, in each case with the events of 1948–54 shown first and labelled '*A*', and with the events of 1973–78 shown beneath and labelled '*B*'.

Stage 1. An increase in domestic inflation and a fall in stock market prices

A. As measured by the percentage rate of change of the Retail Price Index (yearly averages), domestic inflation reached a rate of 6.7% in 1947 and 7.8% in 1948, rates unprecedented in Britain in peacetime this century. Such a phenomenon might well be expected to produce criticism of conventional accounting methods, based upon the use of historic costs for asset measurement and income recording. This may indeed be so, but recent research suggests that falls in stock market prices seem to have a stronger impact upon the profession than rises in the general price level [2], and in fact the F-T 500 share index showed a fall of 4.0% in 1948. Whichever index may be regarded as the more influential, the conditions appear to have been ripe for some professional reaction.

B. From 1953 to 1968, general price increases were below 5% per annum; but in 1970, 1971, 1972, and 1973 they rose to 6.4, 9.4, 7.1 and 9.3% respectively, and there was a fall in stock market prices of 13.4% in 1973. Once again, such rates of inflation might be expected to evoke criticism of the historical cost convention. Matching current revenues with past costs could produce distorted results, since holding gains could be expected to be material, and historical cost accounting includes all holding gains without separate disclosure in reported income in the period when such income is realised. Some professional reaction was to be expected.

Stage 2. A reaction by the accounting profession

A. The Economist repeatedly criticised the historical cost convention between 1948 and 1954; the issue was raised for example in an article entitled 'What are Profits?' published on June 12, 1948, reflecting the concern of businessmen and academics alike. Commercial enterprises repeated the complaint that shortage of capital was damaging British industry, and that this shortage was made worse by the assessment of tax upon the basis of historical cost profits rather than current cost figures. Lord Piercy, for example, made much of this point in his Chairman's Statement in the Annual Report of the Industrial and Commercial Finance Corporation published on November 12,

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[1] Written in April 1978 while the author was working for the United Nations in Nigeria. The views expressed are of course entirely his own.

1948. The accounting profession seems to have agreed with the view that taxation should recognise the effects of rising prices, without agreeing that published accounts should similarly treat rising replacement costs as an expense [3].

The arguments for using replacement costs were not new. In Britain, the work of R. S. Edwards had been widely known since 1938, as was that of R. Sewell Bray. Moreover, two other authors, K. Lacey and Leo T. Little, had published such views widely in the professional press. Influential American writing included H. Sweeney's book, *Stabilized Accounting* published in 1936, which linked American research and earlier European work of the 1920s and 1930s. The mid-1940s was a time of intense controversy over inflation accounting in America, ending with a strong statement in favour of historical cost (similar to the English Institute's N12) in *Accounting Research Bulletin No. 33*, 'Depreciation and High Costs', published by the AICPA Committee on Accounting Procedure in 1947.

In January 1949 the Institute of Chartered Accountants in England and Wales published in its series of *Recommendations on Accounting Principles* its Recommendation N12, 'Rising price levels in relation to accounts'. This briefly reconsidered the alternative options open to accountants in recognising the effects of rising prices in accounts, and concluded that the basic historical cost method was fundamentally adequate, although directors were recommended to anticipate rising replacement costs by means of appropriations of profit to reserves. This represented the orthodox position.

B. On 17 January 1973 the Accounting Standards Steering Committee published *Exposure Draft No. 8*, 'Accounting for Changes in the Purchasing Power of Money', recommending the use of general price indexation in the accounts of quoted public companies. While this appears a revolutionary change in thinking as compared with N12, in fact ED8 merely proposed that the information should be published by way of a supplementary statement attached to the main (historical cost) accounts. Moreover, by 1973 the 'current purchasing power' (or 'constant purchasing power') method was quite a familiar idea, having been proposed to the American profession in the AICPA's *Accounting Research Study No. 6*, 'Reporting the Financial Effects of Price-level Changes', as early as October 1963. The same method had been advocated in Britain in 1968 in a paper published by the Research Committee of the English Institute, *Accounting for Stewardship in a Period of Inflation*; and also in an ASSC discussion paper of September 1971, *Inflation and Accounts.* Such a supplementary statement was, then, by no means a revolutionary proposal by the profession in the face of fast rising price levels and a collapse in stock market values. In May 1974, ED8 was adopted substantially unaltered, and under the same title, as *Statement of Standard Accounting Practice No. 7.*

Stage 3. Intervention by government

A. Following the publication of N12 in January 1949, it was announced in the Budget Debate in April 1949 that studies were to be set up on the taxation of profits and income. This was to include a reconsideration of the accounting definition of profits, in view of the case presented by many members of the commercial and industrial community. The Federation of British Industries was prominent amongst these, arguing that taxation was eliminating all real profits: 'it is fundamentally wrong that industry should need to raise fresh capital merely to preserve productive ability' [4]. In the course of the Budget Speech on 16 April, 1949, Sir Stafford Cripps stated that: 'There is a number of issues arising out of the present structure of taxation, including the incidence of tax and its effects on risk-bearing, which require further examination. We must continue to look to industry, broadly speaking, for the same total contribution to the national revenue as at present, but within this limitation it may well be that the present arrangements could be modified to enable the burden to be more easily borne. An enquiry covering the whole subject would be a very extensive undertaking. I propose to make a start by taking the technical issues which arise in connection with the computation of taxable profits'. This would clear the way, he added, for the general enquiry which he hoped to set afoot at a later stage. There is no doubt that the Chancellor had been concerned for some time over the need to raise the level of industrial productivity. He had called upon the TUC and the FBI on September 3, 1948 to undertake 'parallel and co-ordinated action' to this end; and the FBI had set up on September 8 a special committee to advise on action, leading to a 'Memorandum on Taxation and the Shortage of Industrial Capital' published on December 30, 1948.

A committee of enquiry under the Chairmanship of Mr. J. Millard Tucker QC was appointed on 17 June 1949 to look into the Taxation of Trading Profits, its findings being published in

April 1951. The Royal Commission on the Taxation of Profits and Income was announced on July 27, 1950, and members were appointed on 2 January 1951. The Royal Commission published three reports, in 1953, 1954 and 1955. The accounting profession was invited to present evidence, and the various professional bodies did so. A wide variety of views became immediately apparent. Despite the evident belief of the Council of the English Institute that the assessment of profits for tax purposes could be considered as a problem distinct from the measurement of profits for reporting purposes, the report of the Millard Tucker Committee makes it absolutely clear that the Committee found the controversy over this matter in the profession disturbing. In view of the majority opinion amongst accountants that historical cost needed to be preserved for measuring profits, the Committee would have felt unable to recommend any alternative for tax purposes even if it had felt so inclined [5].

B. After the publication of ED8 and in the face of strong signs of support for ED8 from the profession and from the Confederation of British Industry, the then Minister of Trade and Industry announced that the government was setting up its own committee to study the problem, under the Chairmanship of Mr. F. E. P. Sandilands. The Sandilands Report specifically refers to the relationship between its work and ED8: 'The immediate cause of the setting up of our Committee was the issue by the Accounting Standards Steering Committee (ASSC) on 17 January, 1973 of Exposure Draft 8 'Accounting for changes in the purchasing power of money'. This document gave rise to increasing discussion of inflation accounting throughout 1973 and the first part of 1974, and this was intensified by the issue in May 1974 by the professional accounting bodies of the United Kingdom and Ireland of Statement of Standard Accounting Practice No. 7 (SSAP7) with the same title. The issue of these two documents by the accounting profession focused attention on the need to show the effects of inflation on the affairs of companies. We found as our work proceeded an increasing interest in the subject in the Press and elsewhere, coupled with a growing belief that reform of accounting conventions was a matter of urgency'. (*Report of the Inflation Accounting Committee*, London, HMSO Cmnd. 6225 (September 1975) para. 7). 'While acknowledging the valuable contribution to the subject made by the issue of Exposure Draft 8 and SSAP7 we consider that the most fruitful line of development in inflation accounting is a system based on the principles of value accounting, which shows the specific effect of inflation on individual companies. We recommend that a system to be known as Current Value Accounting should be developed'. (Ibid., para. 11).

Professor Edward Stamp was later to write of 'the rather shabby way in which Mr. Peter Walker went about announcing the formation of the Inflation Accounting Committee, right at the end of the Parliamentary Session, leaving the profession in the dark about his intentions. (And) the fact that the Government, which had been fully consulted about the CPP proposals whilst they were being formulated, suddenly decided to pull the rug from under the feet of the Accounting Standards Steering Committee' [6]. The statement reflects the annoyance and sense of frustration felt by the profession at the intervention of the government, even though this was tempered by optimism in business quarters over the inclusion of taxation in the terms of reference of the Inflation Accounting Committee [7].

Stage 4. 'Radical' studies of accounting techniques

A. Rejection of inflation accounting by the English Institute and by the Millard Tucker Committee came as a severe disappointment to businessmen and accountants within industry and commerce. A series of four articles in *The Economist* over August and September 1951 found a strong response with these accountants, and further strengthened the links already forming between the staff of *The Economist* and prominent members of the Association of Certified and Corporate Accountants. Further studies of inflation accounting were set in train.

Thus, as a reaction to the publication in 1949 of Recommendation N12, two studies were published in 1952, both prepared under the auspices of professional accountancy bodies in Britain, and both advocating the adoption of current replacement cost accounts. The Institute of Cost and Works Accountants (as it was then known) published what amounted to a manual on the application of replacement costs to the conventional historical cost system, in order to replace historical cost figures with their current equivalents. The Association of Certified (and Corporate) Accountants, through their Taxation and Research Committee, published a more substantial analysis of the principles involved [8]. This was based upon the precept that, before profits could be defined, provision must be made for the maintenance of physical capacity. For this purpose, current replacement costs needed to be used to measure the costs of goods sold and the depreciation of fixed assets. The need to change the basis of taxation was explicitly argued throughout the book, which was drafted under the supervision of a committee consisting half of Certified Accountants and half of members of the Economist Intelligence Unit.

Strong cases were also argued for replacement cost accounts elsewhere in Britain at this time. The 1952 International Congress on Accounting was held in London, and the session on 'Fluctuating Price levels in relation to Accounts' was introduced with a paper by C. Percy Barrowcliff of the Society of Incorporated Accountants and Auditors, advocating (as did most of the papers presented in this session) replacement cost accounting instead of conventional historic cost accounts. Given the mood of the Congress on this matter it can hardly have been a comfortable task for Mr. T. B. Robson, the current President of the English Institute, to act as Chairman to this session.

B. 1975 saw the publication of the Sandilands Report [9], which made 'current cost accounting' its chief recommendation, to be used in place of historic cost accounts in published company accounts. Remarkably, in the previous month (August 1975) the Accounting Standards Steering Committee's own study group on the objectives of published accounts made very closely similar recommendations in *The Corporate Report*, working completely independently. Neither group apparently had foreknowledge of the line of thinking pursued by the other, and there was no common membership. Unfortunately, since neither study includes a bibliography or any appreciable number of references, it is hard to identify the ways in which their similar conclusions arose.

Basically the 'current cost accounting' method follows the line of thinking in current replacement cost accounting, but using a concept of 'value' as a capital base in place of 'physical capacity'. The major practical result is that the cost of using obsolete assets is measured not in terms of replacement costs (since replacement in similar form is implausible), but usually in terms of realisable values.

Stage 5. Controversy in the profession

A. Following the publication of Recommendation N12 in 1949, and particularly in view of the setting up of the government's enquiries into the tax system, the professional bodies in Britain embarked upon a series of meetings at which attempts were made to find some common ground. That this proved impossible is abundantly clear from the Report of the Committee on the Taxation of Trading Profits, April 1951, and from the published minutes of evidence before the Royal Commission which followed [10]. Harold Edey of the London School of Economics observed in *The Accountant* on 29 January 1949 that the English Institute was 'lambasted for timidity and for clinging to tradition'. Although his own position was defensive of the English Institute, he referred in the same article to the strength of criticism from *The Economist* and from the *Investor's Chronicle* in both cases in their issue of 15 January 1949. It would appear that the profession was discomfited by the public disagreement between the professional bodies before the Millard Tucker Committee. Soon afterwards an invitation was sent by the English Institute to the other British professional bodies to discuss informally their views on inflation accounting, and a number of meetings took place. Little or no progress was made, however. One such meeting took place on April 4, 1952, and in the following month the English Institute published its Recommendation N15 which reaffirmed once again its adherence to historical cost accounting. Recommendation N15 ends with a note on two subsequent meetings which took place between the professional bodies:

> All these bodies appointed representatives to meet with representatives of the Council with the object of considering whether there is a practicable and generally acceptable alternative to the existing conception of profit computed on the basis of historical cost. A first meeting was held in November 1952, when Recommendation 15 was discussed and the representatives of the Scottish Institute, the Society and the Association undertook to obtain for consideration at a further meeting the views of their respective Councils. (The representative of the Irish Institute was unable to be present).
>
> Memoranda submitted on behalf of the Councils of each of the three bodies were considered at a second meeting in December 1953. At the end of this meeting the representatives of the Council stated that they were willing to arrange a further meeting or meetings if the representatives of the other bodies so desired, but as none felt there was any likelihood of

general agreement being reached between the various bodies it was decided that the discussions should be regarded as closed.

During these two meetings nothing has emerged which makes it necessary for the time being for the Council to amend or add to the comprehensive review of the subject which is contained in Recommendation 15.

After the meeting in December 1953, it was decided that memoranda should be published separately by the relevant institutions. This took place shortly afterwards, with the publication in *The Accountant* of an editorial on 16 January, 1954 objecting strongly to the fact that criticisms were being expressed publicly of the English Institute by other professional accounting bodies. Ironically, it was Gee and Company, publishers of *The Accountant*, who had published the Association's book *Accounting for Inflation* in 1952, upon which the Association's opposition to N15 was based.

B. Controversy in the months after September 1975 was less clearly identified with the various professional bodies. (The Society of Incorporated Accountants and Auditors had in any case been absorbed into the English Institute shortly after 1952; and a measure of co-ordination was being achieved through the Consultative Committee of Accountancy Bodies, set up after a frustrated initiative towards integration in the late 1960s.) Controversy now tended to be between the large professional firms and accountants in business companies in the one camp, and small practitioners in the other. The latter make up a majority of the individual members of the English Institute; and the move by two Chartered Accountants (Messrs. Keymer and Haslam) to call an extraordinary meeting of the English Institute in June 1977 to propose a resolution opposing any mandatory form of current cost accounting was successful, despite a vigorous public relations campaign by the Council of the Institute [11]. Even though the profession itself was in a state of some turmoil over inflation accounting in 1977, some strong authoritative support for the supplementary information to be supplied about current values was contained in a letter from the Chairman of the Stock Exchange to all listed companies, issued shortly after the suspension of SSAP7 on the publication of the Sandilands Report. This letter asked for information on the current costs of goods sold, on depreciation, and concerning monetary items.

Stage 6. A compromise recommendation

A. In the face of resolute adherence by the English Institute to historic cost, and adamant demands for full replacement cost accounting by the ACCA and ICWA, the Society of Incorporated Accountants and Auditors took up a modified reform, suggesting that instead of a complete re-statement of the profit and loss account and balance sheet, all that was necessary was an additional charge in the income statement to reflect the current replacement costs of goods and of depreciation on fixed assets. This suggestion met with a favourable response in some quarters, and statements from the Councils of the Society and of the Association were duly published, recommending action along these lines [12].

B. The Keymer/Haslam resolution made it a practical impossibility for the English Institute to proceed with its support for current cost accounting as already embodied in an Exposure Draft (No. 18) of the Accounting Standards Committee of the CCAB [13]. Despite the diplomatic steps which had been taken to restore the dignity of the profession, badly affronted by the setting up of the Sandilands Committee, the joint government/CCAB Inflation Accounting Steering Group, chaired by Mr. D. S. Morpeth, was halted in its tracks. A new committee was therefore set up on 27 July 1977, under the Chairmanship of Mr. W. Hyde, to prepare a new set of 'interim recommendations' for the Accounting Standards Committee, pending a revised version of ED18 from the IASG. These rapidly appeared, on 4 November 1977, and included proposals for a supplementary statement to be appended to the accounts of companies listed on the Stock Exchange [14]. This statement should show, not a full restatement of the profit and loss account and balance sheet, but merely an amended income statement in which the cost of goods sold and the depreciation of fixed assets shown in the historical cost accounts were both to be augmented by a further adjustment to raise the two charges from historical cost levels to the levels indicated by the use of current costs (as set out in Sandilands and in ED18). A further adjustment should be made to reduce the effects of these supplementary changes if the company is financed in part by loan capital, this adjustment seeking to reflect the concern expressed by the CCAB that Sandilands failed to show the effects of inflation upon the values of monetary assets and liabilities [15].

To some extent this compromise version followed the recommendations of the Chairman of the Stock Exchange, in his letter to the Chairmen of listed companies in September 1975. The 'interim recommendations' drafted by the Hyde Committee appear to have less authority than Statements of Standard Accounting Practice, and in any case apply only to quoted companies.

Stage 7. A reduction in domestic inflation and a recovery of stock market prices

A. After a peak in the rate of increase of the Retail Price Index in 1951 (9.1% due to the Korean War), inflation rates fell to 6.0% in 1952, and to 1.6 and 1.9% in the following 2 years. The stock market rose and fell in 1951 and 1952, recovering in 1953 and 1954 with strong rises of 33 and 17% respectively. The crisis conditions had thus passed.

B. The peak rate of increase of 24.2% in 1975 fell below the 16.5% rate of 1976 to a relatively modest rate of 11.8% in 1977. Historically, these rates are extremely high: the 1977 rate is far higher than the rates during the previous 'crisis' period of 1947–52. However, public perception has been altered by its experience of rates, over certain periods, in excess of 30%, so that 10% appears quite modest. The F-T 500 share index, which fell by 13.4% in 1973 and 41.3% in 1974 (a heavier fall than in the 'Great Crash' between 1929 and 1932), rose in 1975 by 25.0% and in 1976 by 19.8% with further gains in 1977.

Stage 8. Interest in reform dwindles

A. Despite some complaints which met the Reports of the Royal Commission on the Taxation of Profits and Income [16], the profession seems to have had little more to say on the subject of inflation accounting in the years immediately after 1954. Some companies did in fact publish information on the replacement costs of assets (for example, Pilkington Brothers Ltd.); but there was no obligation to do so, and it was not the normal practice. It is noticeable that the submissions to the Jenkins Committee on Company Law (reporting in 1962) included few references to the need for inflation-adjusted accounts, although accounting was one of the headings under which recommendations were specifically sought.

B. It is still a little early to say that the present inflation accounting debate is dying away. However, there are signs of this, despite a rate of inflation which is still higher than the previous peacetime peak this century. (About 13% was recorded in 1940, which is otherwise the only precedent above 10%, even in wartime).

The Inflation Accounting Steering Group is still in being, but its activities are much less frequently reported in the professional press than was the case in the two years up to July 1977. Two surveys by the Technical Department of the Institute of Cost and Management Accountants report some sympathy for the principles of current cost accounting, but a clear majority of respondents take the view that they do not intend publishing extra information unless disclosure is made mandatory [17]. Granted, some companies have published accounts in accordance with current cost accounting principles. Indeed, the wholly-owned British subsidiary of the American family-controlled Mars confectionery company has published in the UK current cost accounts with no historical cost equivalent; and Arthur Andersen and Co. have given the British company a clean audit report [18]. But it seems unlikely that a substantial number of companies will follow even the Hyde guidelines unless obliged to comply with some mandatory requirement, for example for a Stock Exchange quotation.

Conclusion

On the evidence presented there do appear to be close similarities between the earlier and the later cycles. There are of course some differences. The time lags are not the same in each case, for one thing. It took 3 years for the ACCA and ICWA books to be prepared and published, although no doubt some part of this time was due to the attempts taking place between the professional bodies to arrive at a consensus before publication. The two studies published in 1975 were less substantial in that neither supported the arguments with such detailed empirical evidence as the 1952 ACCA study. It is plausible that the debate in the 1970s took place in a more informed environment than that of the 1950s. More had been published on inflation accounting; there were more journals being published, including two widely circulated journals sent free to qualified accountants [19].

Whether the cycle will indeed be triggered off again by some future surge of inflation or by a fall in stock market prices remains to be seen. It is all too likely. Public concern will provoke some sort of professional response, hasty and ill-researched. The government will suddenly acknowledge that the problems of inflation accounting, and in particular the effects of inflation upon the tax system, involve value judgements and social effects which go beyond the authority of the profession to resolve. Government intervention will be resented, and attempts to out-flank the Civil Servants (and regain the initiative) will result in the publication of far more radical reforms than the profession would willingly countenance. Controversy will lead to compromise and eventual inaction as the crisis motivating reform becomes less pressing.

There is one particular measure which could effectively break the cycle, namely a programme of research into inflation accounting and its practical implementation (for example its effects upon the existing SSAPs). This the Inflation Accounting Steering Group is at present undertaking. The chances are that these activities will be allowed to decelerate, instead of being sustained and encouraged. On past experience, this would be disastrous; it would be likely to create just the conditions for a repetition of the cycle, perhaps in rather less than twenty years' time.

References

[1] Accounting Standards Committee, *Inflation Accounting— an Interim Recommendation* (London, ASC, 4 November 1977).

[2] The argument that professional statements of general accounting principles are responses to falls in stock market prices, both in the UK and in the USA, is made in M. J. Mumford, 'A Crisis Theory of Professional Statements of General Accounting Principles', a paper presented to the Northern Group of the Association of University Teachers of Accounting, Liverpool, March 1977.

The Retail Price Index data were compiled from Table 2 of the Central Statistical Office Statement, *The Internal Purchasing Power of the Pound* (December 1973), with figures for 1973 and 1974 from the CSO *Annual Abstract of Statistics* (1976), Table 449; and for 1975, 1976 and 1977 from the *Monthly Digest of Statistics*, May 1978, Table 17.8. The F-T 500-Share Index data are from the London and Cambridge Economic Bulletin, *The British Economy: Key Statistics, 1900–64*, Table G, with the 1973 and 1974 figures from Table 418 of the 1976 Annual Abstract, and later figures from Table 16.16 of the *Monthly Digest of Statistics*.

[3] This view was expressed by Mr. F. R. M. de Paula in a paper at Brighton to a joint meeting of professional accountancy bodies on 18 May 1948, reported in *The Accountant*, 5 June, 1948, pp. 441–3. An Editorial in *The Accountant* of 27 March 1948, entitled 'Quo Vadis?', asked the question whether or not a 'true and fair view' implied the use of replacement costs, commenting that 'many accountants are preaching this same doctrine' (p. 237). The editorial recognised that the Council of the English Institute did not share this opinion, but held that inflation should only be recognised after striking a profit figure based upon historical costs.

[4] *Minutes of Evidence before the Royal Commission on the Taxation of Profits and Income*, Day 4, p. 80, para. 28 (see reference in note 10 below).

[5] *Report of the Committee on the Taxation of Trading Profits* (London, HMSO, Cmd. 8189, April 1951), para. 98.

[6] Edward Stamp, 'Sandilands: Some Fundamental Flaws', *Accountant's Magazine* (December 1975), reprinted in G. W. Dean and M. C. Wells (eds.) *Current Cost Accounting: Identifying the Issues* (Lancaster, International Centre for Research in Accounting, 1977), p. 87.

[7] See for example the Editorial in *The Economist*, 6 September 1975.

[8] ICWA Research and Technical Committee, *The Accountancy of Changing Prices* (London, ICWA, 1952); ACCA Taxation and Research Committee, *Accounting for Inflation* (London, Gee and Company, 1952).

[9] *The Report of the Inflation Accounting Committee* [the 'Sandilands Report'], 'Inflation Accounting' (London, HMSO, Cmnd. 6225, September 1975).

[10] *The Report of the Committee on the Taxation of Trading Profits* (London, HMSO, Cmd. 8189, April 1951); *The Report of the Royal Commission on the Taxation of Profits and Income* (London, HMSO, Cmd. 9474, June 1955), and the Minutes of Evidence published simultaneously.

[11] By coincidence, there was also an International Congress on Accounting in 1977, in Munich, as there had been in 1952. However, in the later year, inflation accounting was much less conspicuous on the agenda, despite several official studies on inflation accounting currently in progress, in America, Canada, Australia, and New Zealand as well as in Britain.

[12] The Council resolutions were in each case reprinted in *The Accountant*, 16 January 1954.

[13] ASC *Exposure Draft No. 18*, 'Current Cost Accounting' (London, ASC, 30 November 1976).

[14] ASC, *Inflation Accounting—an Interim Recommendation.* (Note 1 above).

[15] Consultative Committee on Accountancy Bodies, *Initial Reactions to the Report of the Inflation Accounting Committee (the Sandilands Report)* (London, CCAB, 30 October 1975).

[16] See for example F. L. Clarke, 'CCA: Progress or Regress?', in Dean and Wells, *op. cit.*, p. 74.

[17] See the report in *Accountancy Age*, 11 November 1977, p. 2. The surveys were carried out in 1977 before the publication of the Hyde recommendations.

[18] Reported in *Accountant's Weekly*, 3 February 1978, pp. 3–4.

[19] *Accountancy Age* and *Accountant's Weekly.*

Recruitment, Training, Employment and Careers of Women Chartered Accountants in England and Wales

Rosalie Silverstone and Allan Williams

1. The survey[1]

In 1977 women constituted 2.8 per cent of the total membership of The Institute of Chartered Accountants in England and Wales but this low figure disguises a fairly dramatic change which has been taking place in the profession, namely the recruitment and qualification of an increasing number of women. Recognition of this development prompted the Institute to support a survey undertaken by the Personnel Research Unit of The City University Business School into the employment of women in the profession.

In November 1977, a questionnaire was sent to a random sample of half the women members of the Institute of Chartered Accountants in England and Wales (ICAEW) followed by a reminder to non-respondents in January, 1978. A total of 616 questionnaires were completed and returned, a response rate of 71%. As is usual in surveys of this kind, checks were made where possible to ensure that respondents were representative of the total population of women accountants; they were representative both in terms of geographical distribution and in age, although there was a slight under-representation of those aged over 60 years. This may have been due to accountants who had retired not considering that the questionnaire was relevant to them and thus not completing it; indeed some wrote to that effect or said circumstances were now so different from when they qualified that they did not feel (mistakenly) they would be able to make a useful contribution.

The questionnaire dealt with recruitment to the profession, education and professional training, current employment, long term aspirations, the effect on work of marriage and children, and attitudes towards accountancy as a career for women.

2. Historical background and trends

The first formal admittance of women to the profession came in 1920 in response to the Sex Disqualification (Removal) Act of 1919, when Miss Mary Harris Smith was accepted as a member. She had submitted her first application for membership in 1891 but it was rejected on the advice of lawyers that the use of the words 'he' and 'his' in the profession's Charter clearly did not include women. In her second application in 1899, Miss Harris Smith counteracted this argument by pointing out that a lady had been elected to the Royal Institute of British Architects 'the wording of whose Charter is very similar to your own. If the words "he" and "his" constitute a legal disqualification, the lady cannot be a member of the Royal Institute of British Architects, whereas the elective body states she is a member'. Perhaps suspecting that men might think a woman accountant posed a threat to their monopoly position, she added, 'It is not my intention to trench on what is considered men's ground, but to establish myself as a competent and qualified *Accountant for Women.*' Her second rejection was perhaps to be expected in an environment in which the President of the Institute could claim that 'it would be so embarrassing to manage a staff composed partly of women that he would rather retire

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[1] The authors would like to thank all those who generously gave up their time to participate in the survey, and gratefully acknowledge the help and advice given by other members of the ICAEW.

Table 1
Women members of the Institute of Chartered Accountants, 1920–1977

Year	*Number of women members*	*Increase in number over previous 5 years*	*Number of men members*
1920	1	—	5,342
1925	5	4	6,819
1930	32	27	9,194
1935	57	25	11,510
1940	84	27	13,661
1945	105	21	13,227
1950	137	32	15,123
1955	182	45	18,590
1960	342*	160*	33,525*
1965	464	122	40,295
1970	711	247	49,014
1975	1,413	702	60,305
1976	1,608		61,762
1977	1,868		63,494

*Includes 92 women and 9,936 men members of the Society of Incorporated Accountants which combined with the ICAEW in 1957.

from the profession than contemplate such a position'.[2]

Miss Harris Smith's admission in 1920 was allowed without any examination since she had been in public practice since 1878. In another accountancy body, The Society of Incorporated Accountants and Auditors (which later combined with the ICAEW) Miss H. M. Claridge was the first woman to qualify by examination in 1920,[3] while in the Institute itself this distinction was achieved by Miss Ethel Watts. Phyllis Ridgway in 1922 was the first woman chartered accountant to possess a degree.[4] Both Miss Claridge and Miss Ridgway had been supported in their choice of career by their father who, in the former case, was a President of the Association, and the latter a practising accountant.[5]

Although there was now no apparent barrier to female membership, relatively few women chose to enter the profession and after forty years (1960) only three hundred and forty-two women had joined the Institute's ranks. Numbers continued to grow only slowly in the 1950s despite the passing of the Second World War which, for many women in Britain, had provided an opportunity to enter occupations in which they had not traditionally engaged. It was only in the sixties that female membership began to accelerate and by 1977 numbers had reached 1,868 (Table 1). In the two periods 1965–1970 and 1970–1975 male membership rose by 22% and 23% respectively, whilst among women it rose by 53% and 99%.

Table 2
The main reasons given for few women having become accountants in the past*

	(*N* = *616*) %
Accountancy considered to be a male occupation	27
Lack of careers advice, publicity, information	26
Employer, or male discrimination, prejudice	25
Length of initial training	22
Women's attitudes to family and career	18

*Many respondents gave more than one reason.

3. Reasons for slow growth in numbers

Respondents were asked why, in their view, so few women in the past had chosen to become chartered accountants. While many explanations were proffered, several were clearly believed to be more important than others (Table 2). The following five factors accounted for the majority of explanations:

(i) Accountancy was considered a man's occupation; consequently women did not consider it an appropriate career to pursue. That such an attitude is prevalent is borne out repeatedly by those who have investigated career choice among men and women. Women enter a range of occupations which is far narrower than that adopted by men and these occupations are concentrated in a few industries.[6] Research consistently suggests that early conditioning combined with differential education leads to stereotyped role expectations. Inadequate career advice, a fear of prejudice and lack of confidence contribute to girls choosing familiar and conventional occupations. In addition, anticipation that marriage, domestic responsibilities and child rearing will interrupt a career results in the adoption of low aspirations and a short term training commitment.

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[2] *The History of the Institute of Chartered Accountants in England and Wales, 1880–1965 and its founder accountancy bodies 1870–1880*, Institute of Chartered Accountants in England and Wales, 1966.

[3] Garrett, A. A., *History of the Society of Incorporated Accountants*, Oxford University Press, 1961, p. 121.

[4] *Accountancy*, March, 1977, p. 34.

[5] Garrett, A. A. (note 2 above), pp. 121–2.

[6] Department of Employment, *Women and Work*, Manpower Paper No. 9., HMSO 1974, p. 16.

Table 3
Important factors in career choice (for all respondents, and those in different age groups)[1]

Factors	*All* (*N* = *607*)[2] %	*Aged 20–29 years* (*N* = *326*) %	*Aged 30–39 years* (*N* = *179*) %	*Aged 40 yrs or more* (*N* = *102*) %
Thought the work would be interesting	67	65	74	60
Career prospects	57	66	56	28
Aptitude for working with numbers	54	49	59	65
Salary	38	47	36	14
Security	36	44	37	12
Possibility of combining work with domestic commitments	31	39	30	8
Professional status, prestige	29	32	28	18
Parents	26	24	26	36
Family member or friend who was an accountant	18	13	16	35
Immediate vocational training	17	17	21	7
Career adviser	8	10	7	3
Careers literature	7	9	5	4
Previous experience in accountancy work	7	6	9	10
School	4	2	4	7
Other factors	16	16	15	22

[1] Many respondents mentioned more than one factor.
[2] Age was not given in several cases.

(ii) There was inadequate and inappropriate careers advice. Not only was there an absence of information regarding careers in accountancy, there was positive discouragement from many of those whose responsibility it was to give such advice. Frequently girls had been encouraged to take up more traditional female occupations such as teaching, nursing or secretarial work. This problem was claimed to be particularly bad in girls' schools.

(iii) Training was lengthy. A five year commitment to articles was thought by some to be too inflexible an arrangement particularly when it attracted such low pay and necessitated studying in addition to full-time working, or if a family was planned.

(iv) There was considerable male prejudice within the profession. A sizeable proportion of respondents believed women in the past had been deliberately excluded from the profession by male prejudice or discrimination, which manifested itself in a reluctance to take on female articled clerks. The authors of *Sex, Career and Family*[7] support this belief with the following evidence:

> The Oxford University Appointments Board noted in its report for 1968 that over 90% of the public service jobs notified to it that year were open to women as well as men. In private industry and commerce, however, two-fifths of the jobs notified were closed to women... Half of all openings for articles with solicitors and accountants in private practice were also closed to women.

(v) Finally, women's expectations regarding their future role was thought by respondents to have been a potent influence; the majority of women in former days did not have long term career aspirations and were conditioned to expect that they would become housewives. Other explanations mentioned less frequently included the profession's unattractive image (said to be dull) and parents' reluctance to support their daughters by paying a premium for articles, considering this to be a wasted investment.

4. Recruitment to the profession

Despite these constraints, 1868 women were chartered accountants in 1977. What made them choose the profession, given the same environment as their more conventional peers? Respondents were asked their reasons for choosing a career in accountancy and to recall the factors which influenced their choice. Table 3 shows the percentage of respondents who rated each factor as 'important' in their career choice.

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[7] Fogarty, M. P., Rapport, R., and Rapopoit, R. N., *Sex, Career and Family*, George Allen & Unwin, 1971, pp. 21–22.

Three items stand out in being mentioned by over half the respondents: anticipation that the work would be interesting, the prospect of career progression, and an aptitude for working with numbers. Salary figures in the decisions of well over a third, but it was pointed out on a number of occasions that this referred to the long and not the short term. Other attributes of a professional career, security and prestige, were also important factors, as was the possibility of combining work with domestic commitments.

Parents, other family members or friends played an influential part for 44% of the sample. In some instances family influence had been very strong: 'My father, uncle, four cousins, two great uncles and my great grandfather were accountants.' And the importance of parental financial support was often mentioned.

The fact that accountancy offered immediate vocational training was emphasised by 17% of respondents, many of whom preferred an applied rather than an academic education, or alternatively had to earn while they were being educated. A small proportion of respondents (7%) entered the profession having had practical experience of the work in some other capacity, such as clerical or secretarial work, by finding accountancy part of an educational programme, or through a holiday job. A noticeable feature is the very small part played in career choice by schools or career advisers, bearing out the absence of positive recruitment effort mentioned earlier. There are, however, promising signs of an improvement here since rather more of the younger than older members had been influenced by a careers adviser (Table 3). Among the factors which were subsumed under the category 'other' were flexibility of employment in terms of organisation, specialty or area, the belief that accountancy showed less prejudice against women than other professional occupations; a positive desire not to be directed into a traditionally female occupation; and the ease of obtaining articles.

It is interesting to speculate why women accountants overcame the problems they believed deterred others from entering the profession and refused to settle for a more stereotyped occupation, given the same social pressures to conform. Although there are many reasons for individuals making a particular career choice, in this case it is possible that their numerical ability was an important factor which put them apart from their contemporaries since mathematics tends to be a subject more commonly associated with boys. In 1975 for instance, three times as many boys as girls took mathematics at GCE 'A' level.[8] Numerical ability and academic achievements, therefore, permitted them to consider a wider range of occupations than is normal. It is suggested that such able girls are creating changes in the climate of opinion regarding career choice: 'In a number of schools girls are taking the initiative in planning for their future with or without encouragement from their parents. These examples are mainly found among the more able girls to whom success in public examinations has given the means of overcoming the constraints of customs and traditions.[9]

When recruitment features are considered in relation to respondent age, certain changes in attitude appear to have occurred over time.

Among older women accountants it seems that their numerical and other abilities together with encouragement by family members and friends who were themselves accountants promoted and supported the idea of a career in the profession. Clements similarly found that among men accountants entering industry these two factors had been important.[10] Furthermore, as a high proportion of older women accountants remained single (Table 4) they were able to pursue a career unhindered by restrictions of domestic life. Indeed until fairly recent times many women were expected to leave employment upon marriage; the Civil Service for instance did not employ married women officially until 1946. Table 4 shows that in all age groups a greater proportion of women accountants stay single than among the female population as a whole but among older women the difference is particularly marked. Recent marriage patterns indicate that fewer women are marrying early; thus a comparison with the 1981 *Census* may reveal greater similarities between women accountants and the female population as a whole.

Younger women accountants were attracted to accountancy for somewhat different reasons than their older colleagues. Career prospects, salary and security have become increasingly valued. Furthermore the possibility of combining professional and maternal roles has grown in importance (Table 3). Thus younger women seem to

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[8] Department of Education and Science, *Curricular Differences for Boys and Girls*, Education Survey 21, HMSO, 1975, p. 15.

[9] *Ibid*, p. 23.

[10] Clements, R. V., *Managers: a Study of their Careers in Industry*, Allen & Unwin, 1958, p. 49.

Table 4

Proportion of single women in each age group

Age	*Percentage of women accountants who are single (N = 172)*	*Women in England & Wales (1971)**
20–24	45	40
25–34	26	11
35–44	19	7
45–54	30	8
55–59	70	11
60 and over	60	13

*Source: Derived from Central Statistical Office, *Annual Abstract of Statistics 1977*, HMSO, Table 2.8, p. 18.

have taken a harder look at long-term career prospects in the likelihood that they would be performing two roles, the professional and the domestic; they believed that in accountancy they could achieve both as the emphasis given to this feature confirms. There is no longer the need to sacrifice family life in order to pursue a satisfactory career.

5. The accountants themselves

Age: The membership trends described in an earlier section were amply borne out in the age structure of the sample (Table 5). Three-quarters of the women members were under 35 years of age, whereas among the total membership of the ICAEW (that is both men and women), less than half the members are under 35.[11]

Marital Status and Children

Over two-thirds (68%) of respondents were married, 28% were single and 3% either divorced, widowed or separated. Among the married women, 53% had children. The number of children they had is shown in Table 6: owing to the age of the mothers it is likely that many families are not yet complete. The fact that 44% had a first child under the age of five years supports this probability. Alternatively women accountants may be deliberately choosing smaller than average families. 39% of married women were married to accountants and a further 8% to men who were in the financial sector, such as bankers or stockbrokers.

Table 5

Age of women accountants

Age	*Women* %	*All members (men and women)** %
Under 25	8	3
25–34	67	44
35–44	14	28
45–54	7	14
55 and over	4	11

*Figures provided by the ICAEW.

Table 6

Number of children (as a percentage of those with children: N = 233)

Number of children	% *(N = 233)*	*Sample of women in England and Wales 1976** % *(N = 834)*
1	32	21
2	48	56
3	14	19
4	4	3
more than 4	2	1

*Source: Derived from Office of Population Censuses and Surveys, *The General Household Survey* January 1976, HMSO, 1978, p. 23.

Education

The majority had attended a grammar school (60%) while a further 11% attended private, 12% public and 7% direct grant schools. 31% of respondents had, as their highest educational qualification, GCE 'O' levels or their equivalent (GSC), and 39% 'A' levels or equivalent (HSC). 29% had a degree (Table 7).

Graduate entry rose markedly in the 1970s to 36% from 10% in the previous decade, confirming the trend towards graduate entry found within the profession as a whole. Although exact comparative information is not available, it is suggested that a greater proportion of women than men accountants are graduates. Solomons and Berridge in 1974[12] showed that 14% of the profession aged under 35 possessed a degree; among women accountants in the age group, in 1977, 32% were graduates. Figures provided by the Institute imply that 17% of all members have a degree.

It has already been pointed out that mathematical aptitude was a factor attracting many women to the profession, indeed all but 3% had a mathematics qualification of some kind, 45%

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[11] Figures provided by the ICAEW.

[12] Solomons, D., with Berridge, R. M., *Prospectus for a profession: the report of the long range inquiry into education and training for the accountancy profession*, Advisory Board of Accountancy Education, 1974, p. 171.

Table 7
Educational qualifications

	Highest educational qualification %	Mathematics %	English %
None	0.3	3	3
GCE O level	25	45	68
GCE A level	34	30	15
General School Certificate	6	6	6
Higher School Certificate	5	6	5
OND	0.5	—	—
HND	0.3	0.2	—
Degree	28	9	1
Other educational qualifications	0.2	1	1
Not given	0.5	1	1

at 'O' level, 30% at 'A' level and 9% at degree level. Several people emphasised that mathematical ability is given too great an emphasis in accountancy although numeracy is clearly important. According to Solomons and Berridge,[13] 'an accountant without numeracy... is like a musician who is tone deaf.' The ICAEW emphasises that English is also important in order to perform successfully in accountancy. Again, a very small proportion, only 3%, had not gained a public qualification in English; the majority possessed English at GCE 'O' level (68%).

Training

The initial period of articles (or training contract) was ascertained as well as the length of time it took to qualify. Table 8 shows that 27% were initially contracted for three years, 31% for four and 42% for five years. The shorter the contracted period, the greater was the likelihood of qualification within the expected time. It is recognised within the profession that graduates are more likely to pass their examinations than non-graduates[14] and this held among women accountants although the differences are not startling. Among graduates 86% of those articled for 3 years passed within that time; among non-graduates 71% of those articled for 4 years qualified within the stipulated period as did 67% of those articled for five years. Owing to the spread of years covered by these pass rates, it is difficult to judge whether they differ from those obtained by members overall, although superficially they appear to be exceptionally good. If only recent years are considered, using figures provided by the Institute, it can be calculated that the overall percentage of UK graduates passing their Part II examinations at the first attempt between 1975 and 1977 was 60% (men and women). Among women accountants alone, the proportion was 88% (which included graduates with degrees obtained outside the UK, unlike those in the overall figure of 60% mentioned above).

Table 8
Initial period of articles and the percentage qualifying within that time

	Percentage articled for	Percentage qualifying in expected time
3 years	27	86
4 years	31	71
5 years	42	67

Fifty people had a further qualification of some kind in such fields as management, education or administration, while others held alternative accountancy qualifications such as ACCA/FCCA. More than half of those with a further qualification, however, (28 people) were Associates of the Institute of Taxation (ATII).

6. Current occupation

The majority of women accountants are engaged in public practice (64% including those employed in sub-contract work) and a further 14% in industry and commerce (Table 9). As the majority of them are young and married, many are in the

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[13] *Ibid*, p. 10.

[14] Pratt, M., 'The Foundation courses—an unsatisfactory compromise', *Accountancy*, December, 1977, p. 90.

Table 9

Current employment

	All women (*N = 616*) %		*Working full-time* (*N = 375*) %		*Working part-time* (*N = 163*) %		*All members of ICAEW 1972* (*men and women*) %	
In public practice:								
Sole practitioner	9	64	4	69	23	79	6	48
Partner	6		6		8		24	
Employed	43		59		26		18	
Sub-contract work	6		—		22		—	
Industry and commerce	14		18		9		37	
Finance, banking insurance, etc.	1		1		2		9	
Public administration	1		1		1		1	
Teaching	3		5		1		1	
Other	5		4		9		5	
Housewives full-time (N = 78)	11		—		—		—	

Due to rounding, some columns in this and subsequent Tables may not total 100%.

childbearing stage of their lives, hence 11% are at present employed full-time in the care of children. Excluding this latter group, 30% of women accountants work on a part-time basis.

In 1974 Solomons and Berridge gave details of the employment patterns of all members of the ICAEW;[15] these are used here to compare with the employment pattern of women accountants since a more recent published breakdown is unavailable. It is recognised that the figures are not strictly comparable since they relate to 1972 and include a small proportion of women members; nevertheless certain features are sufficiently striking to justify their use. Considering only women employed on a full-time basis, the proportion engaged as employees in public practice is high (59% compared to 18% of all members) and the proportion of partners in public practice low (6% compared to 24% overall). Similarly, relatively few women work in industry and commerce (18% compared to 37% overall).

The age structure of the workforce may provide an explanation for the type of occupation in which women are engaged. Young accountants are still feeling their way in the profession and sufficient time has yet to elapse for them to have made the decision to move into other spheres, hence the small proportion working outside public practice. For the same reason, few have had an opportunity to become partners.

In addition women may choose public practice since it provides a certain flexibility which is important to those who have, or anticipate having, domestic responsibilities, in particular the availability of part-time work. The tendency to enter public practice may be likened to women doctors entering general medical practice for its flexibility in meeting the special needs of women with children. Accounting teaching also offers certain advantages in this respect, and although the numbers involved are relatively small, women rather than men, appear to be attracted by this type of work (Table 9).

Industry and commerce on the other hand may not appear to offer such flexibility, and fear of prejudice may further deter others from entering this sphere. To quote one respondent: 'It takes a long time to convince people in non-accounting positions in industry and commerce that a woman accountant can have the same knowledge and ability as a male colleague.' Some assessment

Table 10

Level of job held by women employed full-time in public practice

	N	%
Qualified accountants, seniors, supervisors	159	72
Assistant manager or equivalent	18	8
Manager or equivalent	45	20
	222	100

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[15] Solomons, D., and Berridge, T. M. (note 11 above), p. 7.

of the level or grade of job held by women accountants employed full-time in public practice can be made by categorising their job titles into those who are (1) qualified accountants, seniors or supervisors, (2) assistant managers or equivalent and (3) managers or equivalent. Table 10 shows that 72% are in jobs in the first category, 8% in the second and 20% in the third. Managers and their equivalent are found in roughly similar numbers in firms of different sizes. Partnerships, however, are largely concentrated in firms employing fewer than 50 people. Thus it appears that women are moving up the career ladder in firms of all sizes but partnerships as yet tend to be restricted to smaller practices.

7. Specialty

In conversation with accountants in the early stages of the research, it was frequently maintained that women accountants seemed to be particularly attracted to taxation work. Participants were therefore questioned as to their specialty, whether they considered any categories of accounting work particularly suited to women, and whether any were less suited.

Almost half the respondents had developed a specialty, 36 being named, with taxation heading the list (practised by 57% of those with a specialty), followed by auditing (38%). Small audits and personal client work were frequently cited. The question asking whether any categories of accounting work were particularly suited to women received a negative response from two-thirds and a number of people remarked that women accountants were professionals with a job of work to do, and the tasks were no more suited to women than to men, although it was acknowledged that certain work, like taxation, might offer associated advantages, such as more regular hours:

> Some types of work are *convenient* for women. Women with family ties may prefer tax consultancy work or small traders' accounts that can be completed at home but I would not say this work is intrinsically *suited* to women.

Apart from taxation, the type of work more traditionally associated with women, such as that which involved dealing with people, was named, as well as trust, executorship or probate work and private or professional practice in general.

By the same token, most women (74%) felt there was no category of accounting work which was *less* suited to women. Of the quarter who named a less suitable work category, two areas were given particular emphasis, auditing, especially long audits away from home, and industry, especially heavy industry. But here again, it was not the work itself but the necessity to be away from home for long periods, and excessive overtime, which made it less suitable.

Thus most women accountants considered that certain fields of accountancy were not more or less suited to women than men, that an accountant was a professional with a job to do, irrespective of gender. Where certain categories were claimed as more suitable for women, this was only because domestic responsibilities made certain fields more convenient than others.

It is interesting to note that taxation is a shortage specialty and is an area where recruits are being sought at all levels, possibly because it is seen as a 'desk job' and therefore less attractive to some. Taxation may therefore have a dual appeal for women, being both convenient and available.

8. Income

The median income of all women accountants at the end of 1977 was £5,300 per annum. This figure includes the earnings of part-time workers. Taking full-timers separately, their median income was £5,874 with a mean of £6,164. Among full-timers those enjoying the highest earnings were employed in 'banking, finance and insurance' and 'industry and commerce', having a mean income of £8,600 and £7,103 respectively. Only 20% of full-time accountants were working in these industries, however, the majority being employed in public practice with a mean income of £5,724 (Table 11).

As expected, income rose fairly steadily with age and size of firm, and those working in the South East earned more than those in other regions.

Considering the age distribution of women accountants earnings do not appear to be too discrepant from those advertised for accountants as a whole in the *Survey of Salaries in Accountancy and Insurance*[16] although a word of caution in this publication hints at the possibility that lower salaries may be offered to women:

> The time has probably come when women who know that they could do a good job should

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[16] *Survey of Salaries in Accountancy and Insurance*, Autumn, 1977.

Table 11

Average (mean) incomes of women working in different types of employment (full-time) (1977)

	Mean Income £
In public practice:	
Sole practitioner	6,250
Partner	6,864
Employed	5,724
Industry and commerce	7,103
Banking, finance, insurance	8,600
Public administration	6,400
Teaching	6,316
Other	6,571

be active to ensure that they receive the same salary for the same work as men do.[17]

One respondent claimed that while women were generally paid at the same market rate as men when they began a job, they did not necessarily get the same increments. The present study is limited in certain respects by confining itself to women; thus comparative information, which would usefully clarify such points as this, is not available.

9. Job satisfaction

Features of accountancy which were particularly well-liked were variety, meeting and dealing with people, the interest and challenge of the work itself as well as freedom and independence to control it. Respondents did not like routine and repetitive tasks and this feature was often related to feelings of overall dissatisfaction with the work. Part-timers were more likely than full-timers to express particular job satisfaction, and sole practitioners were more likely than others to find their work interesting.

10. Career pattern and the accommodation of a dual role

There is no doubt that the past two decades have seen a considerable change in the climate of opinion surrounding women and work. The change has been brought about by a combination of demographic, employment and economic factors. Smaller families are common, thus the spell of intense domestic activity is confined to a relatively short phase, freeing mothers for the workplace. The increased likelihood of divorce, and the need for additional income as well as the social isolation of domesticity have encouraged women to return to work in increasing numbers. Sectors of the economy in which women are extensively employed have expanded, to which many employers have responded by providing part-time and flexible hours of work.

The structure of women's employment has subsequently developed a distinctive pattern; the majority of women work until the birth of their first child, which usually happens in their twenties; they then withdraw from the workforce and return when their children are considered sufficiently independent to be left. The period of withdrawal may or may not be voluntary. The fact is that there are few alternatives to a mother caring for her own children since domestic and child care help is both scarce and expensive and the state is reluctant to provide nurseries or any other form of surrogate care. Fathers have not yet come to accept their share of responsibility for the upbringing of their children, using the argument of economic opportunity costs—in other words, they earn more than their wives. In an environment in which women generally undertake the least skilled and lowest paid jobs this attitude may be rational, although women fill such positions *because* they have accepted responsibility for the home and thus usually feel unable to commit themselves to more responsible work. The argument is thus self-fulfilling and cannot be sustained when the wife concerned has adopted a professional career. Women professionals may well earn as much as, or more than, their husband, yet still find themselves with the responsibility for domestic affairs. This is frequently of their own choosing for they are well aware of the desirability of stability in a young child's life. A professional career, however, has demanded several years of dedicated effort in training and requires an intense commitment from its female as well as its male practitioners. Women professionals may therefore face considerable personal conflict when they give birth to a child, being torn between the needs of two utterly different yet equally demanding worlds. In order to fulfil this dual role women may work exceedingly long hours and make considerable personal sacrifices in terms of relinquished leisure and possible career opportunities.

There are alternative career strategies which may be adopted by professional women. They may work for a period of time after qualification, withdraw from work when they have a child or children and return either full-time or part-time at a later date; or they may continue working full-time or part-time with paid help for the children. Other individuals may decide that professional life has more of their commitment than motherhood and remain single or childless, as was common in former days.

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[17] *Survey of Salaries in Accountancy and Insurance*, Spring, 1978, p. 23.

One of the aims of the present survey was to determine the career pattern of women accountants and to see how, whether, or to what extent it was possible to accommodate a dual role.

Table 12 shows the pattern of work exhibited by women accountants. It is recognised that the skewed age range of the population studied means that many have not started, or completed, their families: to allow for this, results have been given for all women accountants, for those who are married, and for those who in addition have children. By so doing, it is possible to see the effect of each of these life stages on patterns of work.

Table 12 demonstrates that single women work without a break in their career, and that most married women without children do the same, only a small proportion of them feeling the necessity to change to part-time work or to stop work altogether for a short time (usually due to the exigencies of moving house or going abroad), thus following the same pattern as men.

The majority of mothers (83%) had borne their first child within six years of qualification (Table 13). When the first child arrived the most common response was for accountants to stop work for a time although for the majority (60%) the period lasted less than two years. This finding supports other research showing that the more highly qualified the individual, the greater the likelihood of a speedy return to work after childbirth. Approximately two-thirds of women with children followed this pattern, that is, work followed by a break, for, as one person said, 'How can you fulfil a demanding role at work and still attend ante-natal classes? Or collect your children from school and still be at the client's premises to do the audit?' Nevertheless 28% did not stop work, apart from a short time for the confinement, although a proportion reduced their hours of work and became part-timers. Very few people (5% of those with children) felt the responsibilities of marriage and childcare were such that they were unlikely to return to the profession. It was hypothesised that these might be older women who perhaps had different attitudes towards their role, but such was not the case. To quote one mother:

> I haven't worked since I had a child. From my own experience as the child of a working mother, mothers should be at home.

Others had children who were in poor health and thus needed more than the usual amount of attention. Hence very few women are lost to accountancy through childbearing (although their hours of work are often modified) and this number is probably no greater or even less than among men accountants who turn to other spheres of activity. It demonstrates the considerable career commitment of women accountants and their ability to combine domestic and professional roles. How is it done?

Table 12

Career patterns of women accountants

	All (*N = 616*) %	*Single* (*N = 173*) %	*Married** *without children* (*N = 191*) %	*Married** *with children* (*N = 223*) %	
Continuously employed	64	99	92	12	28
Continuously employed but changed from full-time to part-time work	7	1	3	16	
Interrupted for a period and returned to work	16	—	3	40	
Interrupted for a period—no return by survey date but intend to return	9	—	—	24	
Work truncated upon marriage	1	—	—	2	
Work truncated on birth of first child	2	—	1	5	
Left accountancy for different work	1	—	—	1	
Other	1	—	—	1	

*Excludes those who are divorced, widowed, or separated

Table 13
Length of time qualified when first child born

	Percentage of those with children (N = 223)
Under 1 year	14
1–2 years	25
3–4 years	27
5–6 years	17
7–8 years	11
9–10 years	4
More than 10 years	3

11. Care of children

This is clearly a central problem. Relatively few mothers of children under five were in full-time employment (15%) but those who were had their children cared for in a variety of ways, through day school, crêche or nursery, by paid help, or with the aid of a friend or relative. Part-timers used these methods too but most commonly cared for their children themselves, and sub-contractors often did their work once the children were in bed.

Women who had children of school age were asked how the children were cared for during school term and holidays. Obviously, in term time the children were at school during the day (6% were at boarding school). During holidays mothers were able to call upon the help of a friend or relative (28%) or paid help (11%) but in the majority of cases (55%) the mother herself looked after the children when necessary. Only nine women appeared to receive any help from their husbands, most of whom were able to share the burden because they worked in the education system. One mother, when asked where her children were when she was working, replied: 'Under my feet'.

Despite the various means which accountants had adopted for combining domestic responsibilities with work, there was little doubt that at some time in many careers the problem loomed large for no fewer than 39% of all respondents (which rose to 50% when only married persons were considered). The heavy burden of responsibility led to tiredness, guilt feelings, resentment towards husbands who did not pull their weight and thankfulness for those who did, as well as recognition that a career similar to men was more difficult to pursue: 'I feel I am at a disadvantage compared with most of my male colleagues in finding time to do research and write books.'

Evidently, to combine two roles effectively, two people are needed to do the work, and that second person may be a husband or an employee. Relatively few people in fact employed help in the home (18%), mainly a little help with cleaning and sometimes childminders. A mere handful of women employed a nanny, au pair or housekeeper. Where domestic help was employed, it was more likely to be by women with higher incomes.

Several women minimised the effort involved in coordinating two jobs, saying that it simply needed good organisation or suggested that a professional person should be able to take such things in her stride.

12. Part-time work

Perhaps the single most important feature of the employment market for women accountants is the flexibility offered by the availability of part-time work. In contrast women doctors, for instance, often experience considerable difficulty in finding appropriate part-time work.

As mentioned earlier, 30% of all women accountants worked part-time. Part-time work was undertaken by the majority of those with children (82%) whatever the children's ages, although the tendency was for the amount of part-time work to diminish as the age of the youngest child increased. So whereas 58% of those with a youngest child under five worked part-time, this fell to 34% of those with a youngest child of school age and only 9% of those whose youngest child was over 16. The older the child, the longer were the hours worked by the mother. Perhaps surprisingly the actual number of children an accountant had seemed to bear little relationship to part-time working, over 80% of mothers with one, two, three or more children choosing restricted hours. Thus age of children rather than their number determined a mother's ability to work. The great majority of part-timers continued to work during school holidays.

This duality of professional and domestic roles was perceived as a fairly long term arrangement, for over half of the part-timers said that they did not at present foresee returning to a full-time commitment.

Part-timers are engaged predominantly in three types of practice: as sole practitioners (23%), employees in public practice (26%) or engaged in sub-contract work (22%). They tend, when employed, to work in small rather than large establishments, over half being in establishments of fewer than ten people. It is likely that such work provides small firms with useful flexibility, especially at times of peak pressure. It may have other advantages, for one person pointed out that while her employers only initially tolerated her working at home, they subsequently encouraged it for she was able in her circumstances to work uninterrupted for $6\frac{1}{2}$ hours on a problem, or a draft, or a schedule, in a way that was impossible in an office.

In order to examine in greater detail the opportunities which existed for part-time working, those who were working part-time, had once worked part-time, or who wished to work part-time, were asked whether they had experienced difficulty in obtaining such work. Most (70%) had not. Their jobs had been found by a variety of means and from many comments it appeared that one of the best was to negotiate new hours with a current employer since he or she was aware of the individual's abilities: 'My present employers have said there would be no problem if I have a family some time in the future.' Others circulated all the accountancy firms in their locality with mixed results: 'The first time I used this method I obtained one interview, the second time about six months later, about twelve interviews, and five jobs were offered to me.' Some needed to make no effort since an offer was made to them: 'I was lucky to know a friend who needed an assistant'. Another accountant said she had been approached by many local firms to do part-time work at hours to suit her, 'and I'm quite sure I could find it if I wanted it.'

Not all were so fortunate—agencies were not found to be helpful and since advertising is forbidden it could sometimes prove difficult to get work. Where difficulty had been experienced it was not confined to areas of limited commercial activity, as might have been expected. Cities such as Manchester, Central London and its suburbs, Leeds, Hull, Birmingham, Nottingham and Stoke-on-Trent proved as difficult as smaller towns such as Eastbourne, Plymouth or Bridgwater.

Nevertheless, the majority found no such difficulties and many were delighted to be able to work from home either as sub-contractors or sole practitioners.

Part-time work was not completely devoid of problems, however. It was claimed that rates of pay were lower for part-time employees, the work was less interesting, and it was possible only to 'mark time' in terms of career progression.

13. Retraining

It is particularly important for accountants to be able to keep up with professional developments; if a woman leaves work for a while it may become difficult for her to keep abreast of change.

Those women who had spent a period of time away from work were asked if they had felt a need for retraining before they returned. Over half said they had, yet only 3% were able to find a suitable course to attend, and the need for training grew the longer the time spent at home. To discover what retraining requirements would be, they were further asked what type of course they would like to see provided.

Obviously in many cases children would have to be cared for so some mothers stressed a course held during weekdays in the school term, while others preferred evening classes or residential weekends when husbands could look after the children. Alternatively, the provision of a crêche might solve certain problems of attendance. Many people felt the best arrangement which would cause least difficulty in terms of child care would be a correspondence or Open University course.

Regarding content, a general refresher course was considered desirable by some although not necessarily to retrain in subjects well known, rather to catch up with recent changes. In particular, developments regarding tax, both personal and corporation, were specified, as well as company law, accounting standards and current auditing practice and techniques.

Courses of various lengths were proposed, depending on individual needs, from short intensive crash courses to a more sedate day a week for three terms, or annual refresher courses. A number of respondents were of the opinion that practical experience was the best method of retraining and some form of day release was therefore proposed. It was repeatedly emphasised that refresher courses would have to be cheap, or even free, since they are financed from an individual's own pocket, and for those who are temporarily retired and not earning the fee is difficult to raise. One accountant contemplating having children was very anxious regarding the expected expense of keeping herself informed:

> I am particularly concerned that without very heavy annual expenditure on periodicals (for example Simon's Tax Cases and Tax Intelligence and International Bureau for Fiscal Documentation publications) I shall become hopelessly out of date if I stop working for a few years and return.

Several people pointed out that a number of excellent courses are already available but attendance is usually supported by an employer and not by the delegate.

It was frequently said that a withdrawal from work into the home saps one's confidence, a familiar phenomenon among professional and other women, and one which acts as a powerful inhibitor to re-entry. Any training which makes the transition easier will therefore be of considerable benefit in this respect.

The growing need for retraining or updating for mothers wishing to return to accountancy work, which will grow as the proportion of women accountants increases, coincides with a movement on the part of the Institute towards retraining for all accountants in order to uphold standards. The Continuing Professional Education (CPE) scheme is intended to fulfil this kind of updating function for all accountants. The special needs of women members of the profession could undoubtedly be met under this head. Furthermore, such retraining would be useful for men who work abroad for a period of time, suffer ill health, change their employment for work outside the profession, or for any other reason withdraw from professional practice.

14. The need to work away from home

One point of conflict in the accommodation of dual roles may come when work requires absence from home, for instance during a large audit. A survey among internal auditors showed that managers often felt women had a mobility disadvantage although this opinion was not shared by women internal auditors.[18] Accountants were therefore asked whether the need to stay away from home for short periods of time had ever constituted a problem. Only a small proportion (19%) had experienced difficulty in this respect. In some cases it was because they had responsibility for the care of elderly parents (single daughters often bore this unrecognised burden). In others it was due to societal niceties, such as feeling uncomfortable at using a hotel bar when working away from home on an audit. A proportion of women of course did find it difficult to leave their husband or family. One way of coping with the problem had been to choose a job, or change to one, which did not involve out-of-town travel. A great deal depended on a husband's attitude and several remarked that their spouse was very co-operative: 'I have a husband who believes in me having an independent career. He has never objected when I frequently arrive home after 8.00 pm and shares domestic responsibilities.' Another was less fortunate: 'My husband was not very keen on overtime working or my meeting clients outside office hours and although I would have expected him to understand (being a CA himself), he appeared to think I should *always* place him first.' Single women sometimes reported disliking the disruption to their private life which travelling necessitated but realised both men and women felt that way. Overall, the need to be away from home was not a problem for most accountants.

15. Career advancement

There is evidence that, compared with men, women often have difficulty in achieving equality in terms of career advancement. For instance, the proportion of women managers in industry is extremely low in relation to the number of women employed; in the National Health Service there are relatively few women consultants or principals in general practice; and the proportion of women who are school heads is small in relation to the number of female schoolteachers.

We have seen that in accountancy relatively few women have become partners in public practice and age was considered to play a part here although other factors might be operating. Obviously career advancement is only a problem if ambition is desired but thwarted. Therefore accountants were first asked what were their long term aspirations (Table 14). The results show considerable evidence of high long-term aspirations, a substantial proportion (26%) desiring to become partners or senior partners, directors or managing directors, financial controllers or directors, and so on. Others wish to become sole practitioners, specialists, or work in specific fields such as industry (16%); still more expressed a desire for increased responsibility or decision-making without specifying a particular position (12%). More general aims were advanced by some, for instance to be 'a successful accountant', to have an interesting and worthwhile job, or one which resulted in high job satisfaction.

Aspirations, of course, vary with circumstances. Accountants who were sole practitioners or partners mainly wanted to expand their present practices. Accountants employed in public practice generally wished to become partners or have

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[18] 'Women Internal Auditors in the UK offer suggestions on attracting other women into the field of modern internal auditing', *Audit Newsletter*, October, 1976, p. 18.

Table 14
Career aspirations

	(*N* = *616*) %
Senior partnership, partnership	18
To be a successful accountant, have interesting or worthwhile job	12
Sole practitioner, own practice or business	12
More responsibility in present, or another, job	12
Managing director, director, financial controller/director	8
Able to combine work and home	6
To return to full-time (or to do part-time) work	4
Stay in present post	4
Work in specific field e.g. NHS, teaching, industry	3
Become a specialist	3
Uncertain, not stated, due to retire shortly	13
Other	3

their own practices. Those in industry aspired to becoming, for example, financial director or managing director. Many of those working part-time, or as housewives full-time, were simply looking forward to working more actively or to being able to combine work and home successfully.

Having children may modify aspirations or bring home to individuals the difficulty of fulfilling aspirations once held, since a smaller proportion of women with children aspired to partnerships than those with no children. However, similar proportions of those with and without children still sought their own practice, more responsibility, or to become, for instance, a managing director, although the numbers in these latter categories are small.

Age also determined attitudes towards the future and older women on the whole seemed content with their present positions. Partnerships were rarely aspired to after the age of 35. Less specific aims, such as having an interesting or happy job, were reported by people in all age groups.

It can be said, therefore, that women accountants display a range of ambitions from the highest positions to those which are more modest, but that age and sometimes motherhood appear to modify aspirations. Women with children may be happy to tick over as well as they can until they return to the labour market freed of other responsibilities, but by then they may feel it is too late to aspire to the highest positions.

So far, then, we have established that many women accountants have high career aspirations. We have also seen that proportionately fewer women than men appear to have achieved partnerships in the professional sphere where they are heavily represented, although this may be explained by the factors of age and a modification of aspirations when children are born. But do women accountants also encounter sexual discrimination?

Sexual discrimination in training or at work was reported by 23% of respondents while almost a third (32%) had found equal opportunities for career advancement to be problematic. Distinction should be drawn between sexual discrimination which occurred in the past and that which is current. Older women often said that today's environment was a different world to that which they had known; there were still problems of discrimination but they were less common, overt or humiliating than had once been the case:

> At one audit I was doing for the first time with a male junior the elderly cashier refused to let me have the Cash Book. He would only give it to a man, so the junior clerk had to collect it each day.

A considerable adjustment in attitudes and practices was reported in the recent past and it appears irrefutable that the legislation on equal pay and sexual discrimination has modified, although not eradicated, former problems. In training, for instance, articled clerks had often been paid less than male counterparts, and this discrimination in pay sometimes continued after qualification.

Discrimination in training among the more recently qualified appears to have a more gentle face. Some firms, for example, refused to allow their women students the same experience as male colleagues by debarring out-of-town work, from misplaced concern for their moral well-being (or that of their male colleagues!): 'I could never equate my departmental manager's attitude towards the comptometer operators—no-one worried about *their* morals or their effect on male members of staff!' Moreover, certain tasks such as stocktaking were sometimes considered unsuitable.

Certain relatively trivial but nonetheless irritating differences caused resentment, such as that women students were expected to make tea, type letters, answer the telephone, or were even in one case prompted to learn shorthand, unlike their male counterparts. (The Institute itself was chided for addressing women members as 'Dear Sir', or for inviting only wives, not husbands to official functions.)

Upon qualification, discrimination in the past took the form of: pay discrimination, whereby, for example, men and women from the same office applying for the same job were offered a different salary; difficulty in finding a job as prospective employers believed women did not have serious career intentions; and blocked career progression. A number of women reported lack of success in getting job interviews until they stopped putting 'Miss' after their signature.

Today, discrimination is felt by women mainly to lie in limited promotion prospects, evidenced by the recurringly stated theme that in order to succeed professionally, a woman has to prove herself demonstrably better than a man. Having to prove oneself, in order to counteract the mysterious disadvantage of gender, means more time is spent on the lower rungs of the hierarchy, thus promotion is harder to achieve. It is this problem which seems to occupy the concern of a great number of those who feel discriminatory practices exist today. They fear that the top jobs will be much harder to attain:

> I have been told by a partner in the firm for which I work that to get on, because there is prejudice, a female accountant has to be just that bit better than her male counterpart, and that it takes longer for her to climb the rungs of the ladder. I don't think this attitude is peculiar to my firm.

Some of the difficulty was explained by men disliking being subordinate to a woman. A placement service for accountants recently reported a similar impression gained from employers:

> A few companies are frank that the opportunities for promotion of women are less good than those for men because they have greater difficulty in commanding respect from subordinates. This is probably a minority view and no-one mentions lower standards of technical competence.[19]

Employers are also said to fear that women will leave when they have children. This view is common but in accountancy it could represent the application of dual standards, for many firms rely on a high rate of turnover among newly qualified and junior staff since sufficient higher grade appointments are unavailable within the profession. A considerable proportion of men leave the profession soon after qualification for industry, foreign appointments or other occupations, and return at a later stage, a pattern which in essence is no different from that exhibited by women who are employed in the home for a period of time. The new requirements for a practising certificate will tend to stabilise labour turnover among both men and women.

The possibility that clients rather than the profession might force discriminatory practices upon employers of women accountants was explored. 31% had found client attitudes to be a problem at some time, but just as overt discrimination within the profession has been minimised, so has it among clients. Again, the feeling was frequently expressed that it was necessary to prove oneself capable, before trust and confidence could be established.

In conclusion, it seems likely that the relative paucity of women partners in professional practice may lie to some extent in sexual discrimination, although the picture is confounded by the age structure. On the other hand, it should be pointed out that twice as many women had experienced *no* discrimination in training or at work than had. Indeed the problem was claimed to be exaggerated, or non-existent:

> Anybody who does a decent day's work is welcomed by employers and clients alike. There is more discrimination in people's heads than in fact.

Moreover the rapid expansion in recruitment of women seems to imply that discrimination is decreasing.

16. Accountancy as a career for women

Respondents' views were sought on accountancy as a career for women. Once again, the response evoked from a minority of members was that accountancy was a good career for both men *and* women and that to make a distinction was unhelpful. What this attitude overlooks, according to some respondents in the survey, is the extra effort many women have to make at present in order to achieve the same professional goals as men. They feel they must not only do as well as, but better than, men to achieve similar rewards, and in order to uphold the reputation of all women accountants.

Moreover, if they have children, whatever the help available, their workload is inevitably increased, a problem which does not necessarily apply to fathers. Both these difficulties may be transitional; once women become a more familiar sight in accountancy they will cease to attract special notice and therefore feel less pressure to excel. Having the main responsibility for child care is a more intransigent problem dependent upon changing attitudes on the part of husbands, employers and the state: husbands to be willing to share the work involved in running a home and bringing up children; employers to provide the necessary flexibility of employment to enable this to occur; and the state to provide childcare facilities where they are needed.

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[19] *Survey of Salaries in Accountancy and Insurance*, Spring, 1978, pp. 23–24.

17. Conclusions and some recommendations

This survey has shown that the great majority of women accountants consider they have made a wise and satisfactory career choice. As a profession it provides gratifying extrinsic and intrinsic rewards and has the additional but exceedingly important feature of flexibility in type of work and its arrangement. Nevertheless, certain difficulties have been revealed in an apparent prejudice which results in a reluctance to employ women accountants and to grant them equal promotion opportunities. The relatively little prejudice found can be explained in terms of a change in the climate of opinion towards women working in less traditional spheres when the majority of women accountants were entering training and employment; but probably of greater importance are the continuing demand for accountants and the fact that women entering the profession have been comparatively well educated and are competent.

In the world of business and commerce two reasons often put forward to explain the failure of women to achieve the same degree of advancement as men are (a) their lack of appropriate qualifications and (b) their categorisation as temporary employees because of their expected short working life. The former does not apply to women accountants, and this survey has shown any interruption in a career to be usually short in duration and thus little justification for the differential treatment of women accountants.

Other problems centre around the dual role which a proportion of female accountants are likely to encounter in the course of their career. These may become more apparent in the future as more women enter the profession. Women students entering articles of clerkship or training contracts constituted 4% of the total intake in 1965, 8% in 1970 and 14% in 1975, and according to a survey of employers undertaken by Jane Dummott, it is believed the trend will continue.[20]

A number of suggestions are made below to meet the special needs of this group of members, which will coincidentally help certain groups of men members; but more importantly they will continue to promote a high standard of professional competence in the profession.

(*i*) *Retraining*

The provision of a recognised refresher course, or courses, dealing with recent trends in a number of topics, would be valuable. Although some courses exist at present, for various reasons they were not considered appropriate by respondents. One possible model might be that used for a retraining scheme for women doctors[21] which lasted for two terms and required attendance on one day a week. The first term's lectures were decided by the organiser, the second by participants, and might include practical experience in a work setting. It enabled those temporarily retired to keep up with developments and eased the subsequent return to work. At present such a course could be justified only in London where the demand is greatest but District Societies should be aware of a possible local growth in future needs. A degree of experimentation is initially necessary to explore the most appropriate type of courses in terms of length and content.

Retraining, in the present context, is preparation for re-entry to a particular sphere of work. In many occupations and professions, reentry can prove difficult for women, partly because they are older than male applicants for the same position. This survey revealed little difficulty in this respect among women accountants, but as female membership grows, the profession and the Institute should guard against the possibility that re-entry may be a career bottleneck for some of their members.

(*ii*) *Part-time Work*

It has been shown that the availability of parttime work in the profession fulfils an important need of the woman with a young family. However, difficulties can sometimes be encountered in locating such work. A national placement service specialising in these appointments and maintaining a register of accountants requiring part-time work could provide a valuable aid, and enable the demand for this kind of work to be monitored. The service might be operated by the Institute or a private concern. Employers, on the other hand, could with benefit consider the useful contribution made by part-timers in terms of peak work flow and general flexibility, especially since the availability of such people is likely to grow; employers may be actively invited to consider employing part-timers by the placement service.

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[20] Dummott, Jane, 'Accounting for women's rights', 1977 (Unpublished manuscript, Arthur Young McClelland Moores prize essay, University of Exeter).

[21] Clark, P. A., Silverstone, R., Henryk Gutt, R., 'An assessment of a retraining scheme for women doctors', *Medical Education*, 1977, Vol. 11, pp. 288–292.

(iii) *Financial Considerations*

There appears to be a case for retraining courses to be subsidised for those who are not in employment or only in part-time employment. This same principle, if applied to Continuing Professional Education and other courses already provided by the Institute and profession, might possibly invalidate the need for a special refresher course. It could also be extended to cover attendance at 'in house' training courses, given a willingness to co-operate on the part of employers.

An overall conclusion to be drawn from this study is that accountancy does present an attractive career for women. Although the same problems exist as in other professions, as a result of the dual role which many women have in society, the accountancy profession does appear capable of accommodating itself to many of these problems without too much difficulty. The present study helps to point the direction in which further developments are needed.

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Participation in Budget Planning: the Prospects Surveyed

Lee D. Parker

The concept of participation has lately received an increasing amount of attention from industrialists, unions and politicians. Accountants, too, may find themselves involved in participative schemes introduced into corporate operations and it is quite possible that lower level employee and management involvement in budget planning may be suggested to the accountant as a means of improving the effectiveness of the corporate budgetary system. What is urgently needed is an appraisal of the 'state of the art', since even now many advocates are intent upon treating participation as a universal panacea for all industrial ills. This paper attempts to assess the possible usefulness of participation in budget planning based upon the evidence presently available. As will become apparent in the course of this paper, this whole question is fraught with conflicting evidence, unknowns, contingencies and the continually changing influence of external factors. Nevertheless accountants can still draw certain useful inferences from research findings now available which can assist them in approaching the concept of participation today. The one qualification of which they must remain mindful is that since accounting and indeed participation are conditioned by their social environment, a significant change in that environment might force a reassessment of the evidence at some future date. Such an assessment however is already needed even now.

A problem of definition

The dilemma of trying to define participation is probably best expressed by Hopwood [1] when he claims that the concept 'can mean almost anything to anyone', with it taking on a range of meanings from total group decision making to limited consultation of subordinates by decision makers or from a total emphasis on social welfare to a top management scheme for manipulating personnel. Davis [2] defines participation as 'the mental and emotional involvement of a person in a group situation which encourages him to contribute to group goals and share responsibility in them'. He goes on to stress the psychological involvement of participants in a task and their resulting acceptance of responsibility for their group's work in relation to that task. Here then is a basic conceptual idea of what participation is fundamentally about.

This fundamental concept of participation can manifest itself in a variety of forms and it is to these possible forms that the accountant must first address himself. The range of manifestations of worker participation in the broader sense has been outlined by Blumberg [3] as follows:

Type 1 Co-operation (workers influence decisions but do not finally make them)

1. Workers have right to receive information.
2. Workers have right to protest decisions.
3. Workers have right to make suggestions.
4. Workers have right of prior consultation.

Type 2 Co-determination (workers can take part in decisions and be responsible for them)

1. Workers have right of veto
   (a) temporary, after which management can make decisions or renegotiate with workers;
   (b) permanent.
2. Workers have right of co-decision.
3. Workers have right of total decision.

This most certainly demonstrates the complete spectrum of both active and passive worker roles in a variety of participatory arrangements. At the departmental level, Davis [4] describes participation as existing along a continuum as shown in Fig. 1. Hence at shop-floor level, the accountant is faced with an almost bewildering range of possible budget participation schemes and to further complicate his task of selecting the scheme which seems appropriate to a given situation, he might find it necessary to suggest different forms for different departments within the company. Poole [5] claims that, so far, management has

Figure 1

Amount of Participation	*Description of Typical Action*	*Popular Term*
Low	Manager makes and announces decision	Autocratic Management
	Manager presents decision subject to change	Benevolent Autocracy
	Manager seeks ideas before deciding	Consultative Supervision
Medium	Manager asks group for recommendation before deciding	Participative Committees
	Manager decides with group (one man, one vote)	Democratic Supervision
High	Manager asks group to decide	Free-run Management

shown a preference for consultative styles of participation usually in the form of operating personnel consultation, with managers still making ultimate decisions.

A further classification of types is provided by Child as reproduced in Fig. 2 [6]. Four types of participation are described. Child claims that type A is the aim of many British left wing intellectuals and some trade union leaders and that the works councils at Renold Chains Ltd. and Glacier Metal Co. approximated this type. He further claims that type B approximates to the by now much used joint consultation which he further claims to have been generally considered a disappointment. Type C is said to be derived from the Human Relations approach to organisations and may be used simply as a device to gain employees' acceptance of change. Type D embodies the concept of the self determining work group and may represent certain freedoms from management controls rather than an extensive share in management decision-making. Thus Child has introduced two basic dichotomies. One poses the question of the level at which participation should be introduced (whole organisation or small group) while the other poses the question of the extent of participation desirable (goals and means or goals only).

A range of rationales is used to justify the introduction of participation in an enterprise. For example advocates may see it as causing employees to feel part of a team, to feel respected and to feel that they are an important part of a process. Others look to it as an instrument for improving employee morale, for making work activities meaningful, for increasing productivity, for increasing personal commitment to targets, for improving personal satisfaction and for improving initiative. All of this might be viewed as an attempt to convey to employees the feeling that they are collaborators in an enterprise rather than passive subordinates. Blumberg [7] supports the argument of Argyris in suggesting that as a person moves from infancy to adulthood, he moves from a passive, dependent state to an active independent state and that the autocratic business enterprise tries to force him back to passivity via its chain of command and dependence via his lack of control over his own behaviour. This basic conflict, it is pointed out, may cause personnel to be frustrated and to express themselves in forms of dysfunctional behaviour (such as aggression,

Figure 2

		Scope of Decision-Making	
		Goals and Means	*Means Only*
Focal Level	Whole Organisation	A	B
	Small Group	D	C

regression, apathy, output restriction etc.). It is therefore argued that the more democratic enterprise (using participation) strengthens personnel's natural progression to maturity by allowing them activity, independence, control etc. That some form of participation should help to reduce these drawbacks inherent in authoritarian management is also recognised by Batty [8]. His arguments also recognise that participation can bring together top management's knowledge of broad issues with department managers' knowledge of functional matters. This possibility for the release of lower level personnel knowledge of operating matters for planning purposes is also recognised as a benefit of participation by Knight and Weinwurm [9]. Of course this is one of the prime reasons for considering the use of participation in budget planning and follow-up. This direct benefit to budgeting is further demonstrated by Porter, Lawler and Hackman [10] in their assertion that subordinates frequently possess vital information concerning the levels at which targets should be set when they cite as an example the outsmarting of time-study men by workers in the setting of piece rates.

What participation may therefore be able to offer to the budget process, is the facilitation of information exchange in response to uncertainty. The corporate budgetary system continually embodies the dual roles of prediction and target setting for operational results. Such a process is fraught with uncertainties in itself and yet has been designed as an instrument to improve a company's ability to cope with uncertainty. The more that a budgetary system can be used to encourage the flow of relevant information to decision-makers, the greater is the system's ability to diminish uncertainty. Should participation release more information to budget planners, then the uncertainty surrounding their projections will be diminished and their plans will be based more upon informed, rational judgements and less upon guesswork.

Participation, therefore, as a fundamental concept offers the accountant some possibility of contributing towards an improvement of budget feedback by involving operating personnel in the setting of their own budget targets. This is not the same as arguing that it could be used as a technique to increase productivity or as a means of top management gaining access to hitherto unavailable operating information or as a mere device for manipulating personnel. Indeed the accountant is quite free to try to use participation in any of these ways but he runs the risk of inducing a whole host of dysfunctional consequences when personnel realise his real intentions. However, the fact that the possibility exists for participation to improve budget planning and feedback does not automatically confirm its success in doing so. This question requires further consideration.

Company-wide schemes

Before moving on to look at results of specific experiments in participation in the workplace, a brief survey of company-wide schemes of participation, commonly termed industrial democracy, has some basic implications for participation in budget planning. Company-wide schemes fall, for example, into categories A or B shown in Fig. 2, and serve as an example of participation applied to the whole company. This can give some general indication as to whether the technique can be successfully transplanted into the budget planning situation. Once again a company-wide scheme could occupy any category in the whole range of participation definitions and this must inevitably complicate deliberations about the technique's 'success' (however that is defined) immediately.

What indications can accountants hope to gain from a review of company-wide schemes?

1. The extent of formalisation of procedure for participation most appropriate to the budget situation.
2. The effect upon attitudes of employees to the budgetary system.
3. The level of employee interest in the subject of participation.
4. The degree of employee involvement achieved by the schemes.

Once again it must be remembered that such indications can only be general and may themselves not prove to be transferable to the budget planning situation. Nevertheless, as a first step, they may serve accountants better than mere guesswork.

Just how formal any system of participation should be will naturally depend at least in part upon the nature of each particular enterprise and its environment. Nevertheless, some general indication may be had from a brief consideration of the more highly structured general forms of worker participation in enterprise affairs. Blumberg [11] argues that any device involving workers in the management of an enterprise merely via remote representatives cannot hope to affect their attitudes to their work in the company. Hespe and Little [12] suggest that systems whereby employees are represented by a few of their fellows on boards of directors result in most personnel remaining passive in relation to enterprise affairs. Fox [13] also argues that employee representatives who participate in policy discussions are likely to be viewed with indifference by most of the rank and file employees. The general underlying proposition may best be summed up by Blumberg's citing of the comparison between the psychology of political democracy and the psychology of industrial democracy. It could be said that in politics it is events at the highest level (e.g., national and international) that often concern and interest the individual, whereas in industry it is events at the lowest level (e.g., the factory floor) that more often concern and interest the same individual. This possibility bears further examination.

Emery and Thorsrud [14] report their preliminary conclusions after interviewing employee representatives on some Norwegian boards. They found little evidence of active communication between workers and their representatives. They also report the results of a questionnaire sent in 1962 to 1128 workers and staff of lower rank in 17 enterprises in the Oslo area. This was carried out by the Harriet Holter Institute for Social Research, Oslo. The survey showed that well over half the respondents' desire for participation was directed towards increased participation in decisions regarding their *own* work and *own* conditions.

In France since 1946 it has been compulsory to set up a Comitė d'Entreprise in every company employing fifty workers or more. The committee is purely consultative with the head of the company acting as chairman and members composed of elected representatives of the workers. Ballots are held every 2 years with trade unions putting forward candidates. Hespe and Little [15] claim that under this system the majority of French workers remain passive.

In the summer of 1941, Glacier Metals Ltd. in the U.K. created a 'joint production consultative advisory committee'. In 1951 some study results revealed that employees were generally apathetic towards this form of participation and that while the works committee dealt with peripheral matters, the works council dealt with key matters but in isolation from operations at shop-floor level. Even when structures of representation were changed, there appeared to be little evidence of any change in attitudes or involvement of rank and file employees. In a further analysis of the results, the National Institute of Industrial Psychology formed the conclusion that any form of participation should involve some consulting of the primary work group (i.e., foremen, charge hands and operators) [16].

The structure of co-determination at enterprise level in West Germany is described by Hunnius *et al* [17]. The supreme body is the annual general shareholders' meeting (*Hauptversammlung*) which meets annually and decides on capital raising, articles of association and election of the board of supervision (*Aufsichtsrat*). The board of supervision meets approximately four times each year, appoints and supervises the board of management (*Vorstand*) which has rights and duties specified by company law. In the board of supervision, the worker representatives occupy one third of the seats with the result that in practice workers cannot exert much influence. At workshop level the works council (*Betriebsrat*) operates. It is entirely composed of worker representatives although in practice about eighty per cent of works council members are trade union delegates. Once again both Emery and Thorsrud and Hespe and Little claim that most employees take no part in company affairs and remain indifferent to these systems of representation.

In Yugoslav enterprises, workers elect a workers' council which meets monthly and makes all important decisions (production, financial plans, budgeting etc.). The workers' council elects a management board, mostly from its own members, to act as its agent and at least 75% of management board membership is made up of production workers. This board meets more often than the workers' council and works in partnership with the director. Meetings of workers' council are open and decisions are reached by majority vote of council members. Members of the workers' council serve 2 years after election and members of the management board serve 1 year after election while no person can be elected more than twice in succession to either. The director is the administrative manager of the enterprise and represents the enterprise to outside parties. Hunnius *et al* [18] point out that the director acts on behalf of the workers' council and the wider community and retains the power to veto workers' council decisions which he thinks violate the law. They do admit that although in theory the director has virtually no right to make decisions, in practice he has extensive influence, while the workers' council has legal authority but lacks influence. In 1959, Kolaja [19] carried out a now well known study of two factories in Belgrade involving semi-structured interviews and analysis of personnel files and minutes of previous meetings. He found that workers played only a minor part in managing enterprise affairs compared to managerial personnel. In one factory, he found that worker opposition at workers' council meetings was not organised and petered out. He also found that workers played little part in deciding issues of great concern to management because the matters involved did not interest them. Informal contacts with rank and file employees revealed that they were quite uninterested in the agenda of the workers' council meetings and that apathy and lack of interest in enterprise affairs were common to most employees in both factories. The workers' council nearly always accepted the suggestions of the director and management and council members reported very little of council activities to workers who in any case showed little inclination to seek the information.

Experience with company-wide schemes of participation has also varied between countries. One overview of the type of differences has been provided by Connelly [20]. He found that in Norway great emphasis had been placed on work at shop-floor level but that the ideas of such experiments had not been spontaneously diffused. Participation activity at levels higher than shop floor were a more recent development. Furthermore, he observed that trade unions were active in seeking legislation to back up moves towards worker involvement in decision making. In Sweden he found that the main thrust for participation had come from technical people and production managers and that while some dramatic technical developments had occurred as a result, only limited changes in management-labour power distribution had resulted. Once again, Swedish unions have been seeking tighter and more specific legislation in support of participation. In contrast to the Norwegian situation, he found that West German developments have been mainly at the enterprise policy level and that moves for participation at shop floor level have been made only recently. Once again supporting legislation has set out the structure and rights of participation in specific detail. In the United Kingdom he concluded that major efforts in this area have stemmed from attempts of individual companies and that the advance has been a relatively stop/go process. Where such attempts have been made, they have concentrated upon plant and enterprise level with little interest being shown in developing shop floor projects.

What are accountants to conclude from these observations in such a variety of countries? The admittedly restricted number of cases examined in this paper nevertheless display almost unanimously certain characteristics in common:

1. A lack of communication between workers and their representatives.
2. The general passivity and lack of interest in the participative process displayed by workers.
3. Little evidence of any change of attitude or involvement of workers as a result of participative structures.

Indeed, researchers have argued that formal systems of employee representation often do not seem to interest or involve the majority of employees. In fact it has already been suggested in Connelly's remarks that the pressure for participation has come from a variety of sources in addition to shop floor workers. Accountants might, on the basis of this limited evidence, be forgiven for presently concluding that formally structured systems of company-wide participation have not all lived up to original expectations.

These observations might suggest that the accountant, if installing some participative procedures in the budget system, might find formal structures less than successful, ought to obtain some involvement in budget discussions from the majority of operating personnel and ought to allow personnel to participate in areas that command their interest. If the involvement and interest of operating personnel in budget planning and follow-up is not encouraged, then participation can hardly be expected to contribute to improved budget effectiveness. The budget process is more likely to be improved by each person's contribution of his unique and intimate knowledge of his area of company operations to the planning process and to the investigation of budget variance causes. Although a worker's interest in budget planning and follow-up may only extend as far as his own area of working, the accountant may still need to give him some part in general discussions in his budget area so that he may gain an appreciation of factors affecting budget targets of which he would not be normally aware. If this is not done, the accountant may risk personnel becoming disenchanted if their estimates are not adopted completely. The inherent difficulty however is that involvement of more personnel in general budget discussions could be time consuming and unduly delay budget preparation. It would also appear desirable that the accountant should maintain a somewhat informal style of budget participation without undue recourse to rules, regulations, formal procedural pronouncements, complex representative systems and excessive use of committees, if he is to encourage the continued interest of operating personnel.

The above suggestions for the more efficient installation of participative procedures in budget planning are not all supported as yet by empirical research findings. At present they must stand as deductions from the limited range of observations just considered. Nevertheless they are put forward here as presenting accountants with the basis for a careful approach to this subject while bearing in mind the potential stumbling blocks rather than assuming them away.

Some early findings

The overall evidence as to the effectiveness of participation in general is to date inconclusive. The findings of research studies have been to some extent conflicting while discussions of the subject are often clouded by people's value judgements, political persuasions and personal commitment to the ideals of industrial democracy. For the accountant who is trying to determine the possible usefulness of participation as a way of improving budget effectiveness, it is necessary that some assessment of the evidence concerning participation be made.

In the 133 companies included in Sord and Welsch's study [21] a fairly high degree of participation in the setting of budget targets was revealed as follows:

9% of supervisors did not participate
24% of supervisors initiated budgets for approval by higher authority
32% of supervisors developed budgets in co-operation with budget department personnel
22% of supervisors reviewed and commented on budgets developed by persons other than themselves

In addition, personal interviews revealed a line and staff agreement that it was essential to secure acceptance of the budgets and in many companies where interviews were carried out, budget development involved numerous discussions between individual supervisors and budget planning department personnel. This evident need for operating employee involvement in budget planning was further disclosed by 78% of respondents to a mail questionnaire in their acknowledgement that they would resent plans relating to their own department being developed without their participation or knowledge. In companies which had fostered participation among lower level supervisors, it was found that supervisors were enthusiastic about their budget programmes and felt that they were making an effective contribution to the management process.

A much reported study was that undertaken by Coch and French [22] in their study of the effects of participation on production in a pyjama manufacturing company. Some workers were able to participate in planning a production change while others were allowed only indirect participation. The researchers claimed that results showed participation as yielding significantly higher production than non-participation [23]. Becker and Green [24], however, suggest that it cannot be deduced simply from this experiment whether participation directly improved the incentive to produce, in terms of subsequent productivity, or only bettered morale which then resulted in increased motivation. Nevertheless, they too conclude that the Coch and French results suggest that 'morale and/or productivity are improved by worker participation in planning changes.

Lippitt and White [25] investigated the response of behaviour in a club exposed to leadership styles such as authoritarian, democratic and laissez faire. They found that club members preferred the democratic style of leadership in which activities were decided upon by groups and that this style seemed to generate improved interpersonal relationships, increased morale and higher productivity. Marrow, Bowers and Seashore [26] describe the takeover in 1962 of Weldon Manufacturing Co. by Harwood Manufacturing Co. where Weldon had used a traditional form of authority while Harwood encouraged employees to participate in decision-making. The Weldon operations were appropriately modified and within two years, return on investment had changed from −15% to +17%, labour turnover decreased by 50% and productivity increased by more than 30%. Such evidence is not conclusive, however, since such changes could have been caused by other factors as well. Hespe and Little [27] also cite the findings of Banks (1963), Flanders, Pomeranz and Woodward (1968) and Blum (1968) who all found that very few personnel were interested in participating in decisions at any level other than that relating to their own jobs. This supports the earlier conclusion from the overview taken of company-wide schemes.

Shop-floor involvement in decision-making was also tried at ICI, Gloucester. Daniel and McIntosh [28] report that management in ICI saw three main benefits accruing from this:

1. Personnel's unique knowledge of their work

enabled them to identify waste which only they could know about.

2. Proposed changes were discussed in a positive, co-operative spirit in that instead of management making proposals which were subsequently rejected by worker representatives in formal negotiations, both parties made suggestions and evaluated them together.

3. After formal acceptance, changes took place with speed and without disruption to enterprise life.

The major instrument in this scheme of participation was the encouragement of as much discussion as possible with workers at shop-floor level about any changes which would affect them. The major problem pointed out was that of the apparent erosion of middle management's role. Once again for the accountant considering the use of participation in budget planning, there is the danger that middle management may resent its introduction and attempt either consciously or unconsciously to sabotage any improvement which might otherwise have occurred.

Blumberg [29] has also summarised the findings of some empirical studies of the effects of participation. Bavellas compared the efficiency of sewing machine operators in a garment factory who discussed and decided upon production with that of operators who could only discuss production. He found that the decision-and-discussion group was more efficient. Lawrence and Smith carried out a similar study of office and manual workers in a garment factory and reached the same conclusions. Baumgartel studied the effects of laissez faire, participatory and authoritarian leadership patterns in three different medical research laboratories on medical scientists. He found that participatory leadership was the most effective style for engendering motivation, high morale and satisfaction with leadership. Mann and Baumgartel assessed the concern of field and office supervisors in a public utility company with costs and found that supervisors who were allowed to participate in decisions pertaining to the allocation of funds were more likely to be concerned with costs than those not participating. In examining a delivery service, Vroom found a positive correlation between participation and job satisfaction.

However, not all of the study results which Blumberg cites are as conclusively in favour of the merits of participation as he tends to suggest. Furthermore, the studies often assess the effectiveness of participation from differing standpoints such as motivation, interpersonal relations, productivity, satisfaction, the elimination of friction, morale and employee turnover, so that the extent of effectiveness of a participation scheme may depend in part upon its purpose. Another aspect of this is revealed by Hofstede [30] in his study of manufacturing plants of five companies in different industries in the Netherlands. He found that in a budgeting system higher participation did lead to higher budget motivation although participation in the setting of technical, non-financial standards produced no correlation with budget motivation. This could have implications for the areas in the budget process into which the accountant can best introduce participatory planning and review.

From this brief review it is clear that a considerable body of support has emerged for the benefits to be achieved from the adoption of participation in planning. Many of these studies do demonstrate the likelihood that participation can produce positive benefits to enterprise life, although in varying respects. Some of the studies which are claimed to support the effectiveness of participation use the term in a fairly loose sense. These include comparisons of effectiveness of lecture and group discussion techniques in producing change (which is not really participation), comparisons of persons who had left a company with those who had stayed and the relating of worker grievances and labour turnover to supervisory style of foremen. The eagerness of some advocates of participation to introduce these studies as supporting evidence for the benefits of participation tends to cast some shadows of doubt over other more directly related studies of participatory practices. Nevertheless, the evidence that participation can produce greater involvement of employees in company operations does have some substance and cannot be ignored even if some studies cited are not entirely convincing. However the evidence considered thus far has not established the usefulness of participation in all situations beyond doubt.

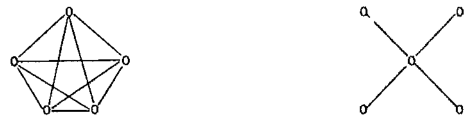
Reservations

The effectiveness of participation in an enterprise can be affected by other factors such as management attitudes, participants' motives and personality traits and the nature of the enterprise itself. A participative scheme which has been successful in one enterprise will not automatically achieve success in other enterprises. This should not be forgotten when examining reported results of empirical studies of attempts at participation, even if the researchers responsible do try to generalise. For example, the Coch and French study earlier examined has been critically assessed by Hopwood [31] who points out that there was in fact very little participation in that most of the proposed changes had been strictly specified by management and that the small amount of influence allowed to workers was merely a management ploy to overcome their resistance to the changes. This amounts to Child's concept of workers being allowed to participate in the deciding of means rather than goals and means and in this study of Coch and French it would seem that even their determination of means was somewhat limited. Hopwood further suggests that when workers have been subject to an authoritarian style of leadership, they may react more favourably to a small amount of participation being made available than they would otherwise. Of course the opposite could be the case and workers might reject participation due to their being unused to any management style other than authoritarian. Nevertheless the suggestion serves to highlight the need for the full circumstances surrounding any empirical study of participatory practices to be fully disclosed. A further relevant piece of information often not disclosed is the length of time over which any observed improvements as a result of the introduction of participation may persist.

Not all empirical studies of participation have demonstrated the positive benefits of participation. Blumberg [32] reports French's study of production workers in a Norwegian shoe factory. Certain groups of workers were allowed to participate in production process decision-making while control groups were denied this opportunity. French discovered that the experimental groups were no more productive than the control groups. In Fleishman's study [33], he found that the productivity of workers who only had representatives allowed to participate in decision-making was just the same as workers who were allowed to participate directly themselves. Another study reported by Blumberg is that of Morse and Reimer [34] involving the study of office workers in a large insurance company. Blumberg uses the study to advance the cause of participation by pointing to the beneficial results of greater worker self-actualisation, greater satisfaction with supervisors and greater satisfaction with the job. However Hopwood [35] points out that the experiment resulted in hierarchically controlled groups achieving a greater increase in productivity than the participating groups, a point which seems to have been conveniently ignored by Blumberg. Hofstede's experiment in the Netherlands, already discussed, revealed that participation in the setting of financial standards resulted in improved employee motivation but that participation in the setting of technical standards did not have the same result. This would seem to indicate that the accountant may not be able to look to participation as the complete solution to the problem of improving budget effectiveness and that, when using the technique, he should not always expect it to be an unqualified success.

Two further experiments with participation are worth considering. Foran and De Coster [36] investigated the relationship between cognitive dissonance [37] and participation by exposing subjects to artificially created circumstances in laboratory conditions. Two groups were asked to formulate standards, one using an all-channel communication network and the other using a wheel network as shown in Fig. 3.

Figure 3



All-channel network Wheel network

The all-channel network allowed the most participation in standard setting since it represented the network with most communication between group members while the wheel network restricted communication to formal communications between each participant and his superior. From the results of this experiment the researchers drew several conclusions:

1. There were no significant differences between participation by the all-channel network and participation by the wheel network on the magnitude of cognitive dissonance.
2. Their hypothesis that authoritarian subjects would experience a greater magnitude of dissonance in participating than non-authoritarian subjects was not supported.
3. Their hypothesis that cognitive dissonance would not occur until after feedback about the acceptability of the performance standards was supported.

4. Their hypothesis that favourable feedback about the acceptability of the performance standards would result in increased commitment to the standards while unfavourable feedback would result in decreased commitment was supported.

The researchers suggested that 1. may have been due to the pseudo nature of participation in the channelled communication network. They also suggested that 2. could have been due to authoritarians being unaffected by the opportunity to participate in decision-making or because they transferred their perceived responsibility for the standards to the group leader.

In addition, the researchers found that before feedback about the validity of selected performance standards, the members of the wheel network felt significantly more involved in the creation of standards than those in the all-channel network but that they were not significantly more committed to the standards. Thus the researchers claimed that their finding refuted the assumption that involvement equals commitment, especially as commitment did not occur until the subjects received favourable feedback about the standards which they had selected. They therefore concluded that participation in standard setting by itself was not enough to secure the participants' commitment but that feedback about the acceptability of their selections was also a prerequisite to their commitment. This would seem to suggest to the accountant that participation in budget setting requires more information to be fed down to operating personnel concerning developments in the current budget if their continued commitment to the budget is to be obtained. This again raises the possible necessity of providing personnel with some information which interests them if the accountant is hoping to encourage their continued interest.

Milani [38] investigated participation in relation to foreman attitudes and performance. The study took place in a company which was a large international producer of heavy equipment where foremen's supervisors determined the extent to which each foreman could participate in budget setting so that some foremen participated to a large degree while others did not. The company used two measures of foreman performance: a 'performance percentage' and an 'hours to base ratio'. Eighty-two foremen's replies to questionnaires were used. The results of this study showed a significant association between performance percentage and budget participation for the first two months but no significant relationship thereafter. A significant association between hours to base ratio and participation applied to the whole period. Furthermore, data showed a significant relationship between budget-setting participation and attitude toward the job but correlation analysis showed no significant relationship between attitude measures and performance. Thus Milani claimed that his findings provided only limited support for advocates of participation in budget-setting such as Argyris and Hofstede. This finding is consistent with some studies already mentioned, which have tended to suggest that participation might have favorable effects upon attitudes but not upon performance. This only serves to emphasise the importance of being clear as to the standpoint from which participation is being assessed (i.e., effective in relation to what?).

From evidence presently available, the benefits of participation can only be accepted with reservations. It cannot be assumed by the accountant to be an unqualified success whenever it is introduced even though it has been advanced by many advocates as a universal panacea. Nevertheless, its often positive effects upon attitudes of participants may recommend it as one of the measures which the accountant might encourage for the improvement of budget effectiveness. This measure however, is one that must be introduced with due regard being paid to the circumstances in each particular company and with preparedness to accept less than spectacular results.

Inherent limitations

Limitations inherent in participation represent another respect which accountants must consider. In his examination of state enterprise in France, Crozier [39] observed that people are ambivalent towards participation since they would like to exercise some control over their own environment but fear that in turn they will be controlled to some extent by other participants. They may also fear that participation will threaten their integrity and independence. Since people in accepting participation are expected to co-operate with others, they may often try to negotiate the terms of the participation in order to extract some reward for themselves as compensation. Crozier also points out that whenever a person feels that his efforts in participating will not provide him with adequate benefits or that he may be manipulated, retreating from participation may constitute a rational reaction on his part. This represents another form of personal adjustment considered appropriate in today's society where personal independence is greatly prized. This explains to some extent the reasons why the accountant may not always encounter enthusiastic reactions from workers when he proposes their participation in budget planning.

Poole [40] argues that workers' participation cannot be restricted to limited objectives since their outcome may be dictated by more general trends over which they have almost no control. The difficulty that operating personnel do not have a knowledge of some of the broad factors affecting their decisions is also recognised by Batty [41] and Davis [42]. The weakness in Poole's argument, which he does recognise, is that as revealed in the examination of company-wide participation, workers are mainly interested in issues directly related to their own immediate working location and conditions. Thus it is likely that participation of operating personnel in budget planning will be best oriented towards their particular areas of expertise although, as pointed out earlier, the modification of their suggestions required by factors of which they are not aware may discourage them from continuing to participate in budget planning and follow-up. The only hope for overcoming this difficulty seems to lie in the full discussion with operating personnel of such factors at the planning stage so that they can assess the extent to which their recommendations have been useful.

So-called 'pseudo-participation', originally identified by Argyris [43], is another aspect of participation to be avoided by the accountant at all costs. This describes any situation where corporate management devises systems which appear to give operating personnel influence over decisions in the company while in reality their influence is negligible. This can be seen by workers to be occurring when their suggestions are not heeded, not used or are not reflected in final corporate actions or decisions. If the accountant allows this to occur in the budgeting system, he risks a breakdown in the budget process when workers react against their opinions being ignored. Even when participation is genuine, some workers may expect to be consulted on matters to which they could not contribute and become resentful when this does not occur.

Other limitations of participation pointed out by Davis [44] include the lack of appeal which it may have to those who are intellectually superior to their group or the tendency of some personnel to not want to be bothered with it. Where there is a lack of trust between personnel, it may be difficult to operate with any success at all. Even the accountant who may be initiating participation in the budget can become so involved in the mechanics of such an innovation that he may overlook its basic purposes. He may find it difficult to encourage co-operation between operating personnel in budget planning due to the existence of unduly complex formal communication structures in the enterprise. There is also the possibility that a rapid transition from management by hierarchical authority to participation may cause insecurity and resistance in the work force although some researchers might debate this. Both Batty [45] and Daniel and McIntosh [46] acknowledge the problem of middle management feeling sidestepped or neglected by any new scheme of participation in budget planning. This reflects their fear of loss of responsibility and status in the enterprise and their feeling that participation is eroding their jobs. Should this occur, they have the power to place significant obstacles in the way of any reformed budget system even if only by blocking and distorting communications in the enterprise. It is another task of the accountant to ensure that any new scheme gives some identifiable role to middle management and that participation does not cause the withdrawal of their involvement in the budgetary system.

One further limitation of participation is to be found in Weick's [47] warning that planning may become an end rather than a means to an end. If by participation, budget planning continues beyond the commencement of the budget period then the exercise loses most of its purpose in that participatory planning becomes a mere public relations exercise which will eventually be abandoned by all concerned. Even if the accountant manages to organise timely planning, he should try to discourage planning groups from becoming insulated from the environment in which they are working. One method available to him may be the provision of summary information about broad issues affecting their budget plans and about related activities and proposals in other sections of the enterprise.

By now it should be becoming quite obvious that the introduction of participation into budgetary planning is a complex affair involving an almost bewildering array of benefits, drawbacks and limitations. The drawbacks and limitations are not raised to suggest that participation can serve no useful purpose in the budget process but appear as necessary factors which the accountant must consider if he proposes to use it as part of his planning improvement programme. If it is rejected at an early stage by operating personnel;

his prior understanding of these possible limitations will enable him to recognise the reasons and modify or even abandon his proposals in favour of more fruitful approaches. Alternatively, should a scheme of participation begin on a promising note, a knowledge of its limitations may enable him to anticipate the development of problems such as planning group insularity and to take appropriate action in advance of any such occurrence.

Authoritarianism

The major influence on the effectiveness of participation would appear to be the extent to which the management of a company can be considered to be authoritarian. Vroom [48] argues that authoritarians and people with little need for independence are unaffected by the opportunity to participate in decision-making. Blumberg [49] cites Vroom's study of first, second and third line supervisors in a delivery company in which he investigated the effect of personal independence needs and authoritarianism upon participation and job satisfaction. The positive correlation which he found between perceived participation and job satisfaction was even greater for supervisors with high independence needs and few authoritarian tendencies.

Fox [50] has argued that employees who have been conditioned to anticipate and accept authoritarian management are likely to be somewhat disconcerted by any rapid change to participation in decision-making. This, he suggests, could cause them to become suspicious that management may be still simply trying to further its own ends under a new guise. Becker and Green [51] argue that when department heads participate in setting budgets and then find that higher management rejects their proposals, they will hold negative attitudes towards management. A further problem with participative decision-making in an authoritarian company suggested by Becker and Green is the tendency to adhere to rigid status differences so that persons of higher status still retain greater influence over decisions. In his study, Hofstede [52] deduced that in the plants where there are more non-authoritarians, personnel have more positive attitudes towards the budgetary system and that participation makes standards much more relevant for personnel. He further deduced that in plants occupied by an authoritarian majority, personnel are often at first resistant to the use of standards although this may gradually disappear if they participate in budget setting.

From these observations, it seems likely that personnel used to an authoritarian style of management (especially in a mechanistic enterprise) may show little desire to participate in budget planning or may be upset by its introduction. Such a situation in a company may militate against the accountant introducing participation into the budget process at all. On the other hand, he may find it possible to introduce participative practices into budget planning in a series of gradual stages in order to allow personnel time to adjust to this departure from previous practice.

Trade union influence

Finally, the accountant must once again give serious consideration to trade union influence upon any participative budgetary scheme which he may devise. He may find it advisable to include shop stewards and the union machinery within his company in any participative scheme. This ideas is basically supported by both Davis [53] and Poole [54]. Davis sees union representatives taking positions anywhere between two extreme viewpoints. One claims that if union representatives participate in helping management decide upon courses of action, the union's ability to challenge those actions is weakened, while the other viewpoint is that participation gives union representatives the opportunity to express their opinions before action is taken. The accountant is likely to find unions in his company taking views which may fall anywhere between these two extremes so that he might gain their participation to some degree or even not at all. The union constantly fears the loss of any worker loyalty and the consequent loss in power that would follow. Union representatives do not wish to be accused by their membership of collaborating with management and the long-run benefits of participation may not secure their continual re-election to office which depends more upon the achievement of short-run results. The reasons why unions might react to participation in various ways are suggested by Poole [55]. Firstly, it can be due to the predominance of one of several types of unionists in a company:

1. Craft workers—interested in extending their control over their own job.
2. Ideological and political unionists—favour more ambitious proposals for industrial democracy.
3. Revolutionary unionists—consider that any limited forms of participation yield no benefit and only distract them from their major aims.

4. Instrumentally oriented unionists—reject participation unless it results in increased monetary rewards.

Secondly, it might be due to the type of shop stewards present in the company. Shop stewards' powers can vary considerably and they interpret their duties in a variety of ways so that they might differ in their views of what constitute legitimate activities. Poole cites some small scale research carried out in Sheffield which suggested that shop stewards could be:

1. Activists—representing the interests of their members fully.
2. Union men—policing union agreements.
3. Representatives—speaking on behalf of a shop but only about issues affecting their own members.
4. Dispute solvers—oriented towards management and mostly concerned with 'smoothing over' difficulties.

Thus, the predominant interests of the shop stewards in a company could also determine the extent of their acceptance of any participation.

Nevertheless, the power of shop stewards cannot be ignored by the accountant. What must be remembered is that unions will react against any threat to their own power and hence tend to fear that participative schemes will undermine the support of their membership. Both union officials and shop stewards will also take pains to guard their own power and status and will therefore be suspicious of any perceived threat to their own position. It must also be remembered, however, that this motivation is no different to that of many other personnel in the company who prize what position and status they have achieved (e.g., middle management and even the accountant himself). Yet the accountant must realise that any attempt to install participative practices in the budgetary system without using any union channels is more likely to incur union resistance than an attempt made to introduce participation via union machinery such as the involvement of shop stewards. It seems therefore, that the accountant cannot escape the union influence on any scheme of budgetary participation which he might think worth trying out and that its potential for acceptance will to some degree depend upon the climate of union-management relationships within the company. It is an influence which most researchers in participation have ignored but which the practising accountant cannot.

The expertise/time lag drawback

A consideration of the task of constructing a master budget for any operating period reveals two major difficulties confronting any participative budget planning scheme. Firstly, lower level personnel may lack the expertise required for comprehension of the range of factors to be balanced in the planning of such budgets as sales, production, materials, labour, administration etc. The problem of their possible lack of interest has already been raised but even if their interest is aroused and maintained, lower level personnel may be limited in their ability to understand the need for identifying the limiting factor, unable to co-ordinate their estimates with those of other draft sub-budgets, unable to comprehend more sophisticated forecasting and simulation techniques, imperfect in their comprehension of flexible budgeting and unacquainted with the broader economic and other environmental factors affecting their operations. These requirements of the construction of a corporate master budget must be met if the range of component budgets within it are to provide the company with anything approaching a realistic overall plan of action. The ability of large groups of lower level personnel participating in budget planning to meet these requirements must at this stage be subject to some doubt.

Even if the problem of lack of lower level personnel expertise can be overcome, there still remains the problem in a participative budgeting system of producing budgets as recently as possible before the commencement of the budget period. The involvement of large numbers of personnel in the planning process presents the accountant with a rather unwieldy group of planners from whom he must collect estimates. Accountants could be forgiven (and possibly justified) for thinking that large groups discussing budget plans may use an undue amount of time in arriving at draft and final estimates. The danger is that they may take so long in arriving at final estimates that the relevant operating period may be half-way complete, in which case the budgetary system's value to the company is vastly diminished. If the accountant tries to allow for this by encouraging planning groups to convene well in advance of the budget period commencement date, then their plans will have been formulated on less recent information and may be out of date by the time the budget period does commence. These problems of lack of expertise and time lag in participative budgeting are of considerable importance and cannot be overlooked.

The accountant's role

This paper has deliberately looked at the possible introduction of participation in budget planning from the accountant's viewpoint. The justification for this is that the paper is designed to introduce accountants to a phenomenon in which they are increasingly likely to become involved and which will affect them most noticeably in the area of budgeting. It must be stressed, however, that the role of higher and lower levels of management in this process is vital and must never be ignored. The accountant may only act as the instigator of the idea of participation in budget planning which then mostly affects and concerns line personnel. Indeed the accountant may not even initiate the idea but may only find himself caught up in it. Nevertheless, as a staff member who provides a range of services [56] to managers involved in the budget process, he should be in a position to advise management about the range of available schemes, their possibilities and drawbacks, the various aspects of the introductory process etc. If the accounting profession still claims that its members occupy a key position as communicators in corporate information systems, then its members must assume an obligation to become at least acquainted with this development.

Conclusions

It must be reiterated that accounting practice is subject to the pervading social environment, and that, accordingly, future changes in that social environment may necessitate reinterpretation of the evidence presented in this paper. Given accountants' recognition of the lack of permanence which conclusions drawn from presently available findings may have, some implications for the budget process can still be drawn. In all probability, the evidence surveyed in this paper will appear to most accountants to be an unstructured mass of overlapping and conflicting findings. Part of the intention behind this paper has been to convey just that impression. As yet there is no clear cut answer to the question mark which hangs over the effectiveness of participation in budget planning and many other company activities. Beyond recognising this problem, some inferences can still be drawn.

From empirical research carried out, it appears that company-wide schemes of participation are often beset by a lack of worker involvement and interest. Participation by lower level workers in budget planning carries with it the danger that middle management will feel that its role has been eroded and may react passively or aggressively against the new planning system. Any tendency towards the maintenance of pseudo-participation may provoke worker distrust of the whole budgetary system. The degree of authoritarianism in management style will affect the extent to which participation in budget planning is accepted by employees. A further threat to the effectiveness of participation lies in the tendency, should it appear, for planning to become an end in itself rather than a means to an end. Finally it has become clear that the results of experiments in various forms of participation have been affected by a host of factors such as the company's history of labour relations, the social background of the workforce, management style, type of industry and work technology etc.

Against the above factors of participation which are known, stands the range of conflicting evidence about the 'success' of participation and the factors about which insufficient is known. Behavioural scientists are as yet not agreed upon the link between morale, attitude, motivation and productivity. If participation improves one, does it affect the others? Would the improvement of any of these improve the budget process? Does involvement in budget planning really lead to commitment to budget contents? Answers to these questions have not yet been established beyond doubt. How 'grass roots' involvement in budget planning can be achieved without incurring delays in budget drafting is yet another problem which must directly concern accountants. It also seems that little consideration has been given to the possible influence upon participative programmes which trade union attitudes may have.

Beyond the above 'unknowns', there are still more areas requiring further research. Is the evidence concerning company-wide schemes applicable to a budget planning situation? How can the erosion of the middle management role be prevented? What is the connection (if any) between budget motivation and participation in financial versus technical standard setting? Most importantly, further experiments must be carried out with specific reference to participation in budget planning by means of criteria such as personal identification with budget targets, level of budget feedback from shop floor upwards, etc.

Even if all of the above questions are eventually answered, certain contingencies will still remain. Participation can be defined in a variety of forms and will never become a self-explanatory 'blanket' term. It will very often be subject to trade union influence and its 'success' will be conditioned by the social and industrial environment in which it operates.

Admittedly, this paper has cast doubts upon the efficacy of the participation concept in some respects; nevertheless it can be argued that accountants ought to be acquainted with progress in this area thus far since they may face pressure for its immediate adoption from idealists, pragmatists and even management. In fact some accountants may find themselves obliged to implement a higher management decision to adopt some form of participative budget planning made on purely political grounds. The problem here is that it may be introduced before its efficacy has been conclusively determined. The unfortunate aspect of such an occurrence might be the danger of its premature demise should it be found to be less than completely successful. What is urgently required is the more definite ascertainment of the advantages and pitfalls of participative budget planning so that any attempts to introduce it in company operations may be made realistically and without excessively optimistic expectations.

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[55] Ibid, pp. 109–119.
[56] These already often include provision of budget system framework, setting time schedules for completion of budget drafts, provision of information and technical assistance to line personnel drafting budgets, co-ordination and consolidation of departmental budgets, preparation of current reports and special studies.

Addendum

The author is indebted to the editor for providing this journal as a venue for the publication of an article of this length occasioned by the breadth of the subject matter and its related literature. In reviewing the literature referred to in this paper, readers should bear in mind that the paper was submitted for eventual publication in *Accounting and Business Research* in 1976. However, it is the author's view that evidence from post 1976 literature has not required revision of this paper's arguments.

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Dowlais Iron Company: Accounting Policies and Procedures for Profit Measurement and Reporting Purposes

J. R. Edwards and C. Baber

Construction of the first blast furnace at Dowlais was begun by Thomas Lewis of Llanishen during the 1750s. Resources required for the purpose of financing the initial iron making activities were raised by the formation of a partnership, in September 1759, with a joint stock of £4,000. There were nine founder partners, each of whom agreed to subscribe for one, two or three-sixteenths of the joint stock. The first blast furnace was completed in 1760 and production was eighteen tons per week. The Dowlais Iron Company (DIC) was formed in 1787, with a capital of £38,000, to continue the business. The level of activity remained fairly modest, and it was not until the second decade of the nineteenth century that profits regularly exceeded £10,000 per annum. It was the boom years of railroad expansion which, by 1842, transformed DIC into 'the first [ironworks] in the world'[1] with output 'far beyond what any other works could manage'.[2] By this time the company, which distributed its rails world-wide, was under the firm management of Sir Josiah John Guest who, by the early 1850s, had bought out the last remaining partners to achieve also sole ownership.[3]

DIC suffered a temporary setback in the years immediately preceding and following the death of Sir John in 1852. This apart, the company continued to prosper with resources, as before, directed primarily towards the manufacture and sale of iron rails. From 1865 DIC developed steel making activities following the successful Bessemer experiments at the Works.[4] Concomitant developments were the emergence of DIC as a coalmaster and increasing sources of unearned income in the form of dividends from the Orconera Iron Ore Company[5] located in Spain—a supplier of iron ore as the Welsh valleys ran out—and interest on the large quantities of liquid assets managed by the London office of the company (London House).[6] On 27 September 1899 the Dowlais Iron, Steel & Coal Co. Ltd. was formed with a capital of £1,100,000 to acquire the industrial properties of Lord Wimborne, the beneficiary under the trust set up at the time of Sir John's death. Two years later the new company merged with the Patent Nut & Bolt Company Ltd., belonging to Arthur Keen, to form Guest Keen & Company, and in 1902 a second merger resulted in the creation of Guest Keen & Nettlefolds Ltd.

The purpose of this article is to examine and evaluate the accounting policies and procedures employed by the management of DIC during that company's period of explosive industrial development which began in the 1830s and continued throughout the nineteenth century.

Accounting policies

It is unlikely that any firm would have grown to the size and achieved the significance of DIC in the absence of a satisfactory system for recording both inflows and outflows of cash and other assets and the movement of resources within the firm. The various book-keepers employed from time to time by DIC maintained the books of account on a strict double entry basis. Since the Dowlais Iron Company was a family firm, quite naturally many personal transactions were undertaken by the owners through the business bank account and consequently entered in the books of the company. Nevertheless the idea of the business as a separate entity was fully appreciated, and non-business transactions were properly accounted for through the various partners' current accounts.

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[1] Main series letter book, 1842(2) f.368, S. W. Roberts of Philadelphia to Thomas Evans.

[2] Earl of Bessborough (ed.), *The Diaries of Lady Charlotte Guest*, John Murray, 1950, p. 171.

[3] J. A. Owen, 'Chronological Date Sequence of Events for the Dowlais Ironworks', in *Merthyr Historian*, Merthyr Tydfil Historical Society, first edition 1976, pp. 7–16, for much of the factual data in this paragraph.

[4] J. A. Owen, *A Short History of the Dowlais Ironworks*, Merthyr Tydfil Borough Corporation, 1972, pp. 34, 35 and 39.

[5] Formed in 1873 by DIC in conjunction with the Consett Iron Company and others.

[6] Details of the revenue derived from these various sources are contained in *Statement of Profits 1864–1894*, Glamorgan Record Office (GRO) D/DG, Section E, Box 2.

The reporting aspect of the accounting function was, judged by contemporary standards, equally satisfactory. Three of the four fundamental accounting concepts specified in *Statement of Standard Accounting Practice No. 2* (SSAP 2)[7] issued by the Accounting Standards Committee in 1971, namely 'going concern', 'consistency' and 'prudence' were generally adhered to in financial statements prepared for DIC. The 'accruals' concept received less recognition, especially in its application to the treatment of capital expenditure. An explanation for this may be found in the Statement itself which recognises the potential conflict between different concepts and recommends 'that where the accruals concept is inconsistent with the "prudence" concept the latter prevails'.[8] A strict application of this proposal would, of course, entirely undermine the 'accruals' concept. This is not intended by SSAP 2 and a comparison of current practice with that prevailing at DIC during the nineteenth century merely indicates that a fairer balance between the two concepts is today regarded as appropriate.

The reporting entity

Accounting for the activities of DIC was complicated by the necessary division of functions between the Works situated in Dowlais and the London office located in the City.[9] Essentially, all the manufacturing activity occurred at Dowlais and shipments to customers were made from either Cardiff or Liverpool depending upon the final destination of the consignment. The London House's functions included invoicing customers,[10] collecting cash, meeting most liabilities[11] and investing any liquid resources which were surplus to the firm's immediate requirements.[12] The financial manager's choice of remunerative outlets for resources available for investment was, however, constrained by the need to ensure, as far as possible, the availability of sufficient cash to cover both partners' drawings and projects involving major capital expenditure.

The profit and loss account of the Works included the surplus earned by the London House as a separate item. Since goods despatched to customers were charged to the London House at selling price, neither a profit nor a loss arose in the books kept at the London office when the cash was collected.[13] Consequently, the surplus consisted solely of investment income less miscellaneous expenses. Balance sheets were prepared both for the London House and for the Works, and these were linked by current accounts representing the indebtedness of the former to the latter. As a check on the accuracy of the head office (Works) accounts a periodic comparison was made of the profit balance appearing therein with the increase in net assets appearing in statements, prepared at the London office, which combined the balance sheets of both sections of the firm.[14] Neither was the importance of verifying the detailed records of the firm ignored. We are told that 'the best possible men are selected for the checking of all the Books of the Works, and the work is diligently pursued'.[15] Evidence of the existence of this internal audit function relates to the period of G. T. Clark's managing/trusteeship,[16] 1856–1892. Later, in 1878, appears a reference to the fact that 'the London House books will shortly be audited in the usual manner',[17] but no explanation is given of what this entailed.

From 1860 onwards Annual Reports were prepared by the company's accountant, both for the purpose of analysing the financial data contained in the accounts and to discuss the progress made at the Works during the previous twelve months. These reports are extremely wide ranging and provide some indication of the vast amount of financial and quantitative data used by the Dowlais managers as a basis for cost control and resource allocation decisions. Recognition of the importance of overall financial management is evidenced by the practice, engaged in at the London House, of preparing each month a forecast of cash inflows over the next 3 to 6 months and a statement of anticipated cash outflows extending at least one month ahead.[18] In addition an *ad hoc* exercise was usually undertaken and an estimate of the financial implications prepared whenever a major investment project was under consideration.[19]

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[7] *Disclosure of Accounting Policies.*

[8] para. 14(b).

[9] From 27 April 1839 the City office of DIC was located at 42 Lothbury.

[10] Report by W. Jenkins to G. T. Clark dated 15 November 1861, GRO D/DG, D.

[11] *Monthly financial statements and notes*, March 1849, January 1851–July 1853, GRO D/DG, E8.

[12] The company invested in the stocks and shares of railway, trading and manufacturing companies and also, from time to time, deposited substantial balances with various banks.

[13] Which would include any bad debts incurred by the firm: profit and loss account of London House for year ending 31 March 1843, p. 18, GRO D/DG, E3(i).

[14] Letter from H. A. Rate to the Trustees Clark & H. A. Bruce, 26 July 1860, GRO D/DG, E2.

[15] Annual Report, 1866, p. 38, GRO D/DG, E3(ii).

[16] Annual Report, 1867, p. 31½, GRO D/DG, E3(ii). Whether a similar exercise was undertaken during the Guests' reign has not been discovered.

[17] Annual Report, 1878, p. 21, GRO D/DG, E3.

Presentation of financial data contained in the annual accounts

No attempts were made at DIC to classify profit and loss account items, and the nature of the information contained in that document is discussed in the section entitled 'Treatment of capital expenditure'. The earliest balance sheet which has survived, that for the year to 31 March 1834, extends over fourteen pages, contains one subheading, 'Petty Ledger accounts', and no subtotals.[20] The 1836 balance sheet reveals the existence of a separate private ledger since the capital Stock account balance and the partners' current account balances were listed under this heading.[21] By 1838 certain asset accounts, namely the cash balance, bank balances and bills of exchange, were also contained in the Private Ledger.[22] Three years later a major innovation occurred. The balance sheet for 1841 consists of the itemised balances of three separate ledgers: the Large Ledger covering stock-in-trade, freehold estates, general debtors, the London House current account and general creditors; the Petty Ledger, and the Private Ledger. The debit and credit totals from the Large Ledger and the Petty Ledger were transferred to the sheet containing the list of private ledger balances; the result is a summary balance sheet.[23] By 1861 the company's accountant had adopted a policy of inserting an appropriate narrative against each total.[24] The nature and significance of the various items contained in the 1861 balance sheet reproduced below may be summarised as follows:

1. Balances extracted from the Private Ledger comprise the sub-totals £279,657 (debit) and £521,296 (credit). The total described as 'Lands, Mines, Plant & Effects' is made up of the 1849 valuation of the Works, £263,200 (see section entitled 'Capital stock'), plus a small amount of capital expenditure subsequently incurred at DIC which, in contrast with normal practice, was not written off to revenue. Stock £503,200 describes the book value of the capital investment in the firm, whilst the £17,168 represents undrawn profits.

Balance Sheet (Private Ledger)—30 March 1861

Dr.					Cr.
52	To Cash	786	27	By Exors Sir J. J. Guest, Bart	925
79	„ Lands, Mines, Plant & Effects	278,871	48	„ The Lady Charlotte Guest	3
			76	„ Stock	503,200
			107	„ Profit & Loss	17,168
		£279,657			£521,296
290	To Lower Branch Capital a/c (Ledger A2)	35,486			
215	„ Stocks on hand	211,236			
315	„ Sales a/c (London House)	23,562			
213	„ Debts owing to the Co. (Ledger B4)	8,774	213	By Debts owing by the Co. (Ledger B4)	37,419
		£558,715*			£558,715

* Shillings and pence are omitted throughout this article.

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[18] *Monthly financial statements and notes.*

[19] For instance, *Memorandum of required and actual expenditure on new work, 1848–54*; also *Penydarren Iron Company Valuation, 1858–60*, GRO D/DG, E8.

[20] Balance Sheet, 31 March 1834, GRO D/DG, E3(i).

[21] Balance sheet, 31 March 1836, p. 13, GRO D/DG, E3(i).

[22] Balance sheet, 31 March 1838, p. 21, GRO D/DG, E3(i).

[23] Balance sheet, 31 March 1838, p. 8, GRO D/DG, E3(i).

[24] Balance sheet, 31 March 1861, pp. 38–39, GRO D/DG, E3(ii).

2. Ledger B contained general debtors and general creditors, previously listed in the Large Ledger, together with the Petty Ledger balances.
3. Ledger A contained the residual data transferred from the Large Ledger, analysed between 'Lower Branch Capital a/c' representing the cost of a railway built between 1849–1853, 'Stocks on hand' and the London House Current account entitled 'Sales a/c (London House)'.

The balance sheet listings which present assets ahead of liabilities might also be noted.

Treatment of capital expenditure

Items of capital expenditure normally appeared in the profit and loss account of DIC as a cost for the year in which the expenditure was incurred. This was not an unusual treatment; during the nineteenth century businesses experimented with a wide variety of different methods of accounting for capital expenditure. Systematic depreciation accounting did not achieve widespread acceptance until the very end of the nineteenth century.[25] Prior to this the inclusion of fixed assets indefinitely at cost, or at a valuation, or at cost less related revenues were examples of methods which attracted their adherents[26] in addition to the approach, commonly employed at DIC, which required income to bear all capital as well as revenue outlays immediately they were incurred.

The profit concept obtaining at DIC throughout the nineteenth century is referred to by W. Jenkins, the company's accountant, in a report to G. T. Clark dated 6 November 1860:

> Great caution appears to have been constantly exercised to keep the profits down by providing for future.... necessary outlay to carry out large extensions and improvements in the power of manufacturing iron, and more than this, the principle of paying off *all outlay* annually has been adhered to with scarcely any exception.[27]

The failure by many companies to incorporate the widely discussed,[28] though by no means fully understood, distinction between capital and revenue expenditure into their profit measurement procedures undermined the usefulness of reported profit as a performance indicator.[29] During a period of steady trading activity and stable prices it is quite likely that expenditure on fixed assets produces a reasonable approximation to depreciation; however, the upturn in capital expenditure which necessarily precedes an expansion of business operations must artificially depress reported profit where such outlays are immediately written off to revenue. The potential danger of this is not only that wrong assessments may be made of past performance but that management will be discouraged from undertaking new projects whose cost must fall on current revenue despite the fact that benefits, in the form of extra income, are yet to emerge. In practice the capital accounting procedures employed at DIC may not have seriously distorted the decision making machinery. This contention is based on evidence which suggests that the profit figure shown in the annual accounts was viewed primarily as a measure of resources available for distribution.[30] Furthermore, this interpretation is consistent with contemporary ideas concerning the purpose of periodic profit measurement.[31]

There is clear evidence that management was not uninterested in the level of reported profits appearing in the annual accounts or the relationship of these figures to the declared results for earlier years.[32] Nevertheless, quite separate financial data were used for performance assessment and decision taking purposes. In the monthly management accounts only those costs which are likely to have produced some fairly immediate benefit were included.[33] Consequently significant amounts of money spent on improving or extending existing fixed assets were debited to the cost sheets and included amongst production costs[34] but New Work, which described capital expenditure resulting in additional fixed assets that were incomplete and/or unproductive at the balance sheet date,[35] was debited to the general profit and loss account together with other miscellaneous expenses not directly contributing to income arising from a particular aspect of the firm's activities.[36] Further evidence of the fact that management did not consider such expenditure part of the ordinary operating costs may be found in the Annual Report for 1865 which adds expenditure on New Work to the reported profit figure in order to compute what is described as 'actual Net Profit'.[37] Although the decision to exclude fixed assets from the balance sheet is explicable in terms of management's desire to equate reported profit with distributable surplus it must be accepted that the chosen method of accounting for capital expenditure did result in the understatement of product costs due to the absence of any charge to reflect the gradual consumption of capital assets.

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[25] A. C. Littleton, *Essays in Accountancy*, University of Illinois Press, 1961, p. 83.

[26] B. S. Yamey, H. C. Edey and H. W. Thomson, *Accounting in England and Scotland 1543–1800*, Sweet & Maxwell, 1963, esp. pp. 197–199.

[27] Letter from Jenkins to Clark, 6 November 1860, p. 4, GRO D/DG, E2.

[28] The importance of separating capital from revenue was stressed by the Select Committee of the House of Lords on Audit of Railway Accounts, *BPP*, 1849, X, Third Report, 421, at p. xv.

[29] The absence of a uniform treatment of capital expenditure in the accounts of railway companies, prior to the Regulation of Railways Act 1868, is referred to in H. Pollins, 'Aspects of Railway Accounting before 1868', *Studies in the History of Accounting*, edited by A. C. Littleton and B. S. Yamey, Sweet & Maxwell, 1956, p. 332 at p. 339. The likely impact on reported profit of expenditure misallocation is considered in R. P. Brief, 'Nineteenth Century Accounting Error', *Journal of Accounting Research*, 1965, p. 12.

[30] Annual Report, 1863, p. 24, GRO D/DG, E3(ii). Between 1860 and 1884 a series of extremely interesting progress reports was prepared for Clark by the company's accountant.

[31] Preoccupation with divisible profit, which culminated in a number of well known cases during the second half of the nineteenth century, persisted until the 1930s when, in the general reaction to the Royal Mail case (*Rex v. Lord Kylsant and another, 1931*), accountants began to appreciate the importance of producing a figure which fairly reflected earning capacity: see J. R. Edwards, 'The Accounting Profession and Disclosure in Published Reports, 1925–1935', *Accounting and Business Research*, Autumn 1976, p. 289 at pp. 298–303.

[32] Annual Report 1868, p. 1, GRO D/DG, E3(ii). Annual Report 1872, p. 1, GRO D/DG, E3.

[33] See also the section entitled 'Costing Data'.

There is evidence which suggests that some uncertainty existed at DIC concerning the exact significance of capital expenditure. The term extraordinary expenditure, to describe outlays on New Work, is regularly used[38] whilst exclusion of such payments from the balance sheet is justified on the grounds that profit should be represented by 'the increased legitimate assets of the concern'.[39] The relationship between capital investment and commercial viability does not seem to have been fully grasped even by Lady Charlotte Guest, who had overall control of the firm's affairs for four years following her husband's death in 1852. Her diary includes the following reference to a meeting with the trustees on 24 November 1857:

> Still I grieve to find that nearly £100,000 has been lost or sunk in new works since I gave up the management....[40]

Internal finance and business expansion

The fixed asset valuation procedures adopted for the purpose of preparing the annual financial reports were crude but effective. The essential contribution of the system of capital accounting adopted by DIC was that it helped the firm to grow to an immense size with virtually no recourse whatsoever to external finance. Reliance on internal finance does, however, present problems immediately trading fortunes decline. These problems are accentuated where the absence of non-cash expenses such as depreciation means that a trading loss causes an equivalent outflow of funds from the business. An examination of the profit figures listed in Appendix A reveals that, for the greater part of the nineteenth century, capital investment was unlikely to have been inhibited due to the absence of internally generated finance. It was only during the 1850s that trading results were consistently unfavourable—a period spanning the death of Sir John Guest, Lady Charlotte's period of leadership and the early years of the Trust.

The reversal of trading fortunes reflected in the reported loss for the year to 31 March 1851 did not cause immediate financial embarrassment; a substantial balance of liquid resources had been accumulated during the previous fifteen to twenty years when the demand for rails either at home or abroad had remained consistently buoyant. A succession of trading losses, however, quickly absorbed this reserve fund[41] and the paucity of financial resources available during the 1850s was a major constraint in implementing the ambitious plans for reorganising the Works, worked out by the brilliant engineer William Menelaus and others. In the absence of internally generated sources of finance, working capital requirements were provided, in the short term, by various devices such as discounting bills of exchange in advance of maturity,[42] borrowing from the Residuary Estate[43] and raising bank loans.[44] Reorganisation of the ironmaking activities[45] restored profits to acceptable levels by the mid-1860s, and retention of the internally generated funds completed the recovery process.

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[34] Annual Reports 1861, 1864 & 1866, at pp. 2, 12 & 4 respectively, GRO D/DG, E3(ii).

[35] Letter from Jenkins to Clark, 6 November 1860, p. 14, GRO D/DG, E2.

[36] Such as rates, general charges, income and property tax, bad debts.

[37] Annual Report 1865, p. 16, GRO D/DG, E3(ii).

[38] For instance, letter from Jenkins to Clark, 6 November 1860, p. 4, GRO D/DG, E2.

[39] Annual Report 1866, p. 5, GRO D/DG, E3(ii).

[40] Earl of Bessborough (ed.), *Lady Charlotte Schreiber, Extracts from her Journal 1853–1891*, John Murray, 1952, p. 73.

[41] The net asset value of resources managed by the London House amounted to £132,673 at 31 March 1851, whereas eight years later liabilities exceeded assets by £3,888; balance sheets of the Works, GRO D/DG, E3(i) and E3(ii).

[42] London House series letter books, 1854, ff. 738, 756, 815, 903; 1855, ff. 930, 933, G. Kitson to Lady Charlotte Guest.

[43] Letter from Bruce to Lady Charlotte, 2 November 1861, p. 4, GRO D/DG, E2.

[44] *Lady Charlotte Schreiber, 1853–1891*, p. 73.

[45] William Menelaus, *Report on the Dowlais Works—14 November 1857*, GRO D/DG, C8.

Departures from normal procedures

Items described as 'New Work' amounting to £1,366,165, or £23,155 per annum, were written off during the period 1831–1889 (Appendix A). In most years New Work consisted of capital expenditure incurred during the accounting period. There were, however, a number of departures from normal practice which included the following:

1. A provision of £20,000 was made out of the profits for 1839[46] to defray part of the planned expenditure on the Ifor Works during the years to 31 March 1840 and 1841. The commendable caution displayed by management, on this and other occasions, is in no way undermined by employment of the description 'provision' for what was, in fact, an allocation of profits. The fact is that no distinction had yet been made, in accountancy, between the terms provision and reserve. These words have been used interchangeably during the present century. In 1903 Lawrence Dicksee defined a reserve as follows:

> A RESERVE may be defined as a provision charged against profit with a view to covering an expected loss.[47]

As recently as the 1920s and 1930s the annual accounts of many companies failed to distinguish appropriations of profits from charges against profits.[48] This distinction, which is of crucial importance if reported profit is to be used as a yardstick for the purpose of assessing performance, did not receive formal recognition until 1944 when the Institute of Chartered Accountants in England and Wales issued *Recommendation on Accounting Principles No. 6* entitled 'Reserves and provisions'. In the 1840 balance sheet of the Works the 'Suspense Acct to meet New Works' together with a 'bonafide' provision entitled 'Suspense Account to meet Bills not recd. and Doubtful Debts' are listed immediately after the capital Stock balance and balances on partners' current accounts.[49]

2. Freehold estates, held as business investments, were recorded in the balance sheet[50] between 1834 and 1845. Advantage was taken of the very high profits earned during the following year to clear these capital items from the books of the company.[51]
3. In 1846 the Edge Hill Mines, which were purchased from Sir John's personal estate for £11,248, were capitalised and 'written off by the profits arising from the *Mine* itself'.[52]
4. Between 1848–1856 capital expenditure totalling £51,790[53] was omitted from the profit and loss account, a procedure quite possibly adopted in order to conceal the full extent of DIC's diminished fortunes. Existence of inefficient productive processes during this period was reflected in the abnormally high operating costs. For instance, the computed cost of iron for October 1854 was £7.14.6 per ton, a figure which John Evans claimed was 'far too high to carry on the works to a profit'.[54]

Evidently H. A. Rate of the firm's London office concurred with the sentiments expressed by the Works manager. In his view:

> No average range of prices even in a healthy and prosperous condition of trade could meet a cost of £7 per ton and it is very evident that the concern was, in the period referred to (1853–1855), only saved from disaster by the fortunate circumstances of prices having risen to a degree entirely exceptional.[55]

In the absence of firm evidence it is idle to speculate on the possible explanation for this rather more significant departure from the company's conventional method of accounting for capital expenditure. Certainly W. Jenkins, who was instructed by the resident trustee, in 1860, to go through the books for the last thirty years 'to collect such information as will show what system was adopted in this period in declaring the profits and losses in these Works' was sufficiently impressed by what he saw to report as follows:

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[46] Letter from Jenkins to Clark, 6 November 1860, p. 5, GRO D/DG, E2.

[47] L. R. Dicksee, *Depreciation, Reserves and Reserve Funds*, Arno Press, New York, 1976, p. 47, reprint of the 1903 edition published by Gee.

[48] Some indications of the widespread acceptance by the business community of secret reserves may be found in 'The Accounting Profession and Disclosure in Published Reports, 1925–1935' at pp. 292–293.

[49] Balance sheet, 31 March 1840, p. 21, GRO D/DG, E3(i).

[50] The method of valuation appears likely to have been original cost less property income subsequently arising.

[51] Profit and loss account, year ending 31 March 1846, p. 11, GRO D/DG, E3(i).

[52] Letter from Jenkins to Clark, 6 November 1860, p. 9, GRO D/DG, E2.

[53] *Ibid.*, pp. 11–14.

[54] Main series letter book, 1854, f. 530, John Evans to Lady Charlotte.

[55] Letter from H. A. Rate to the Trustees, 26 July 1860, GRO D/DG, E2.

> 'From the Year 1848 to 1856 it may be said that there was no fixed system laid down for shewing the Profits of the Works... Under the partnership[56] this [referring to expenditure of £34,486 on the Dowlais Branch Railway] would most certainly be treated as an Estate or as a set of Pits and cleared off out of profits. This is still held up as an asset....[57]

No useful purpose was served by this departure from normal accounting practice if the result was to obscure the full extent of the firm's difficulties. On the contrary one may suspect that the decision making machinery was sabotaged and fundamental reorganisation of the productive processes unnecessarily delayed. This theory receives some support from the assessment of the state of the Dowlais Works made by Menelaus at the time of his appointment to the position of Works manager in June 1856:

> Within the last four years at nearly every work in Wales the makes and yields of the furnaces had been improved, rapid strides were making in the way of producing cheaper pig iron. Dowlais was standing still, instead of taking the lead as from her size and position she ought, she was falling into the rear.[58]

Capital stock

Over the years significant and sometimes confusing changes have occurred in the accounting vernacular. One of the most interesting is the revised meaning ascribed to the term 'Stock' when used to describe items appearing in a company's balance sheet. Today the stock figure encompasses unprocessed raw materials, work-in-progress, and finished goods awaiting delivery to customers. During the nineteenth century the term was often used to denote the owners' investment in the firm, i.e. what is now called capital.[59]

It is clear that the nature of this Stock account, however peculiar, was fully appreciated by management:

> ....the whole may be looked upon as a great Current Account of Floating Assets and Liabilities, no additions being made to the Assets for improvements of plant or extensions in the Works.[60]

The initial Stock of £4,000 had been increased to £117,543 (Appendix A) by 31 March 1831 and was augmented by further charges against profits until, by 31 March 1847, it had reached £240,000. Additions to capital Stock were required primarily for the purpose of financing additional stock-in-trade which rose from £34,494 to £173,774 during the corresponding period.[61] The only other occasion on which an addition was made to the capital Stock occurred in 1849 when the 'Land, Mines, Plant and Effects' of DIC were capitalised at £263,200 based on a valuation prepared by Messrs. Stephenson and Malins.[62] In addition, the Troedyrhiw Estate, previously written off in 1846, was re-introduced with an attributed value of £32,000.[63] The reason for this departure from normal accounting practice was the need to place a value on the Works for the purpose of deciding the amount payable to Wyndham William Lewis, who retired on 31 May 1848, for his $\frac{5}{16}$ share in the Partnership.[64] The Troedyrhiw Estate was, in fact, transferred to Lewis in part satisfaction of the agreed amount due to him causing a corresponding reduction in the capital Stock balance reported in the 1850 balance sheet.

After 1850 the capital Stock remained unchanged at £503,200. At first sight this would seem peculiar for, although the policy of charging capital expenditure to revenue continued, floating assets—stock-in-trade and debtors—increased enormously reflecting the continuing growth in business activity during the second half of the nineteenth century. The explanation is that, from the 1860s onwards, there was a steady rise in the credit balance on the Trustees Ledger Account,

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[56] This reference is to the Guest-Lewis partnership which was dissolved on 31 May 1848.

[57] Letter from Jenkins to Clark, 6 November 1860, pp. 10–12, GRO D/DG, E2. Since Jenkins undertook responsibility for the accounting function in 1856 (see p. 15 of the letter) he was presumably commenting on the measurement procedures employed by his predecessor, J. Walkinshaw.

[58] *Report on the Dowlais Works—14 November 1857.*

[59] The various meanings attached to the term Stock, particularly in relation to accounting matters, are discussed by Louis Goldberg 'The Word Stock', *Australian Accountant*, January 1956, p. 11.

[60] Annual Report, 1865, p. 1, GRO D/DG, E3(ii).

[61] Figures derived from balance sheets of the works, GRO D/DG, E3(i).

[62] Letter from Jenkins to Clark, 6 November 1860, p. 2, GRO D/DG, E2.

[63] *Ibid.*

[64] The entire business was valued at £640,000 for the purpose of establishing the amount due to Lewis and a fair copy of the ledger entries required to record this event is set out in a letter from Theodore Jones, Actuary and Accountant, (son of Edward Thomas Jones, the author of *Jones's English System of Book-keeping, by single or double entry* published in 1796) to Walkinshaw, 2 December 1850, GRO D/DG, E2. The £200,000 due to Lewis for his five-sixteenths' share was paid by instalments spread over the eleven year period 1849–1860. Private ledger 1 April 1843 to 31 May 1848 f. 151, GRO D/DG, Misc.

Table 1[65]

Year	Stock investment £
1834	34,494
1844	137,650
1859	220,684
1863	255,134
1874	457,583
1884	376,650

representing undrawn profits, in contrast to the pre-trusteeship practice when the entire reported profit was divided and paid out to the owners.

Valuation of trading stock

The wide range of material inputs, together with the fact that the company marketed its products throughout the world, obliged management to maintain a substantial holding of stock-in-trade. Consequently the level of reported profit was extremely sensitive to errors occurring during the course of the valuation process which was itself complicated by the fact that manufacturing methods at Dowlais were at the forefront of nineteenth century technological advance. Some figures for trading stock appear in Table 1. Management was fully aware of the importance of obtaining a fair valuation for stock-in-trade:

> On the proper valuation of these large quantities depends the correctness of what we call profits. An error in the valuation of Rails and Bars in Stock would, of course, alter the result for the year.[66]

Physical stock-takes were undertaken for the purpose of obtaining year-end figures, and conservative valuation procedures consistently applied to the resulting totals.[67] Stocks of raw materials and finished goods located at the Works were included at cost or at a valuation below cost.[68] The underlying objective is disclosed by the accountant's observation that 'all stocks are valued at a low uniform rate, so as to prevent as far as possible fictitious profits'.[69] Finished goods earmarked for particular contracts, which were located at the Cardiff Yard awaiting shipment,[70] were valued at selling price based on figures supplied from the London House.[71] This reflected management's view that realisation occurred, for the purpose of profit recognition, when goods were despatched from the Works to Cardiff. Since these stocks were invariably the subject of firm contractual obligations this was an entirely satisfactory accounting policy.

Whether to match, as far as possible, production with sales or maintain a steady output, resulting in stockpiling during duller trading periods, is a fundamental business problem. The latter strategy depends, for its success, on the ability of management to predict accurately the future demand for the company's output; forecasting errors not only entail the cost of financing unnecessarily high stock levels but also result in the deterioration of items in store. Within the iron trade it was, perhaps, the Crawshays of Cyfarthfa, bitter rivals to Dowlais, who were the leading exponents of this policy but not always with success—for instance, it was estimated that their company lost £40,000–£50,000 due to stockpiling in the mistaken belief that prices would rise in 1830.[72] On the basis of available evidence the managers at Dowlais pursued the more cautious business strategy,[73] although this resulted in the company from time to time losing orders when for some reason demand exceeded production at the Works.[74] Even so Dowlais could not entirely escape loss due to 'stock depreciation'—for instance, in the accounts for the year to 31 March 1878, £30,585 was written off as the result of applying what is today described as the 'lower of cost or market value' rule.[75]

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[65] The 1834 and 1844 figures are derived from the appropriate balance sheets whilst the 1859, 1874 and 1884 figures appear in the balance sheets of those years; the 1863 figure is extracted from that year's Annual Report, p. 4, GRO D/DG, E3.

[66] Annual Report, 1863, p. 5, GRO D/DG, E3(ii).

[67] Annual Report, 1865, p. 17, GRO D/DG, E3(ii).

[68] For instance, during the 1860s and 1870s management's policy was to include the company's substantial stocks of Welsh mine at 10/-d. per ton whereas the cost of getting this raw material was in the region of 13/-d. to 14/-d. per ton. Annual Reports 1868, 1871 and 1872 at pp. 27, 21 and 14 respectively, GRO D/DG, E3(ii) and E3.

[69] Annual Report, 1864, p. 23, GRO D/DG, E3(ii).

[70] The location of the ironworks at Dowlais was initially determined by the availability of essential raw materials in the Merthyr district. Gradually reliance on indigenous material inputs declined and, in order to minimise transportation costs, the decision was taken, in 1887, to re-locate the steelmaking capacity of the firm at a site adjacent to Cardiff Docks: *A Short History of the Dowlais Ironworks*, pp. 49–50.

[71] Annual Report, 1863, p. 6, GRO D/DG, E3(ii).

[72] J. P. Addis, *The Crawshay Dynasty*, University of Wales Press, 1957, pp. 80–81.

[73] London House series letter books 1849, f.789, Kitson to W. Wood; 1856, f.195, Kitson to Menelaus.

[74] London House series letter book 1854, f.789, Kitson to Lady Charlotte; ff. 813/4, Kitson to Menelaus.

[75] Annual Report 1878, p. 14, GRO D/DG, E3.

Costing data

The Dowlais managers displayed a keen interest in the cost of carrying on manufacturing activities at the Works. Due to the existence of intense competition within the industry,[76] however, costing data are unlikely to have had much relevance for price fixing purposes. There were many occasions when the ironmasters attempted to reduce competition either by agreeing minimum prices or by regulating the make of iron. Indeed it has been suggested[77] that Adam Smith's observation that 'people of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public or in some contrivance to raise prices'[78] possibly had the ironmasters in mind. But attempted associations such as 'The Welsh Quarterly Meeting' which lasted from 1802 to 1826,[79] invariably collapsed due to undercutting in order to keep the furnaces employed.

Information concerning the cost of inputs was, however, extensively used as a basis for financial control since management was fully aware of the fact that profit depended primarily on the margin between costs and revenues rather than the price of iron and steel.[80] The company operated a system which can be broadly described as output costing. The objective was up-to-date figures for costs per ton of finished product—initially only iron, but in the latter part of the century also steel. An appropriate system of expenditure analysis provided a foundation for the collection of input costs which were periodically re-charged to the intermediary process accounts and the finished goods account via cost sheets, on the basis of current costs.[81] In the case of raw and partly processed materials such as coal, mine, limestone, purchased ores, pig iron and puddled bars, the charge to the cost sheets depended on the quantity of resources consumed.[82] The cost of working the blast engines and forge engines was re-charged to the appropriate stages in the productive process on the basis of throughput[83] whilst for cottages provided for colliers a 'rate per day' basis was adopted.[84] In addition, fixed allocations were made to most cost centres in order to cover running costs.[85] Residual balances remaining on the material input accounts, after closing stock had been credited, represented over or under recoveries for the year.[86] Although such variances were disposed of through the annual profit and loss account, the continuing aim was to keep such discrepancies to a minimum or at the very least to ensure that the debits and credits approximately cancelled one another out.[87] It is for this reason that cost centre recovery rates were regularly updated in order to ensure that the cost of iron was fairly stated.[88] Service departments, on the other hand, such as the foundry, were regarded as profit centres and expected to yield a surplus as the result of being credited with a fair price for the items which they manufactured.[89]

Despite the high level of capital investment at DIC the company was, by present day standards, essentially labour intensive. Consequently there existed a sensitive relationship between wages, total costs and profits. A 20% wage reduction, put into effect during the year ended March 1858, reduced the cost of iron by 12½%[90]—although it must be remembered that expenditure on New Work, which was debited directly to the profit and loss account, did not fall on the cost sheets. The case in favour of keeping wage rates to a minimum was, therefore, clear enough and industrial relations at Dowlais were marked by regular periods of unrest caused by threatened and actual reductions.[91] A quite separate reason for minimising the rewards to providers of labour was based on an observed inverse relationship between wage rates and effort:

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[76] A. Birch, *The Economic History of the British Iron and Steel Industry 1784–1879*, Cass, 1967, c.vi.

[77] *Ibid.*, p. 105.

[78] Adam Smith, *The Wealth of Nations*, Vol. I, Everyman Edn., p. 177.

[79] E. W. Evans, 'The History of Industrial Relations in the South Wales Coal Industry to 1912', A thesis presented to the University of Wales for the Degree of Doctor of Philosophy, 1955, pp. 28–30, referred to in *The Crawshay Dynasty.*

[80] For instance, *Report on the Dowlais Works—14 November 1857*, which examines a variety of innovations designed to reduce operating costs; also Annual Report 1861, p. 9, GRO D/DG, E3(ii).

[81] Sheets showing the cost build-up of materials and finished goods manufactured at certain times during the 1840s and 1850s still exist, GRO D/DG, C4.

[82] Annual Report 1864, pp. 14–15, GRO D/DG, E(ii); Annual Report 1881, p. 14, GRO D/DG, E3.

[83] Cost of materials and iron made at Dowlais, Nov-Dec. 1845, April 1847–May 1848, Oct.–Nov. 1851, Aug.–Sept. 1852, GRO D/DG, C4.

[84] *Ibid.*

[85] Annual Report 1868, p. 29, GRO D/DG, E3(ii).

[86] Annual Report 1878, p. 15, GRO D/DG, E3.

[87] Annual Report 1866, pp. 33–35, GRO D/DG, E3(ii).

[88] Annual Reports 1864 & 1865 at p. 14 and p. 16 respectively, GRO D/DG, E3(ii).

[89] Annual Report 1864, p. 14, GRO D/DG, E3(ii).

[90] Annual Report 1861, p. 2, GRO D/DG, E3(ii).

[91] M. Elsas (Ed.), *Iron in the Making*, County Records Committee of the Glamorgan Quarter Sessions and County Council and Guest Keen Iron & Steel Company Limited, 1960, pp. 33–57.

> In times of depression like the present, with wages as low as they can well be, and prices of food high, workmen are steadier and work harder, the result of which will be seen in the very greatly increased quantity of raw material produced....[92]

Although the relationship between costs and revenues was undoubtedly of fundamental importance, management by no means confined itself to figures for cost per ton manufactured as the basis for resource utilisation and resource allocation decisions. Extensive use was also made of quantitative data, expressed in terms of output and yield, for comparative purposes. The widespread use of numerical data both for the purpose of identifying inefficiency and in order to monitor progress is illustrated in the *Report on the Dowlais Works—14 November 1857*[93] written by the general manager of the Works in 1857.

Summary and conclusions

If there was one factor above all others which explains DIC's position of pre-eminence within the nineteenth century iron industry it is effective management. The company benefited from the direction provided by a succession of firm and dynamic leaders possessing complementary skills. Prominent in the earlier years were Sir John Guest and John Evans whilst later on G. T. Clark and William Menelaus[94] constituted a brilliant managerial/engineering combination. Most of the major strategic decisions were startling successes. These included the decision, made at an early stage, to concentrate facilities on the manufacture of rails; the decisions to sink pits at Vochriw[95] and Bedlinog[96] and purchase the Pen-y-darren Iron Works and mineral leases[97] which not only safeguarded supplies of high quality minerals but also enabled the company to sell South Wales steam coal on the open market in the second half of the nineteenth century; the decision made in the mid-1850s to reorganise the Works extensively, including the construction of a new mill 'designed of twice the power of any Mill in the Kingdom';[98] the decision to persevere with the Bessemer experiments and the decision to join in the formation of a Spanish iron company[99] to ensure suitable supplies of ore. In these matters and others the accounting function fulfilled an essentially supportive role.

The complexity of the firm's operations which was aggravated by the necessary division of functions between the Works and the London House produced difficult accounting problems. On the whole satisfactory solutions were devised. The recording aspect of the accounting function was carried out meticulously and receipt and payment of cash carefully controlled. Management reports were comprehensive and fulfilled the information requirements of the firm's leaders. Profit measurement and asset valuation procedures, fashioned to meet the peculiar requirements of the company, were effective. Ironically that aspect of the company's procedures which is open to greatest objection by comparison with modern methods, namely the system of accounting for capital expenditure, was crucial to the success of the firm. The immediate recovery from revenue of resources expended on fixed assets not only allowed the company to develop and prosper free from the shackles imposed by reliance on external finance, but also fostered financial stability. The decision to finance capital expenditure out of current revenue ensured that the scale of activities was restricted, as far as possible, to what the firm could safely afford. If, in exceptional circumstances, management was obliged to incur capital outlay which caused total costs to exceed total revenue no distributions were permitted until the deficit had been made good.[100]

Frugality and self-sacrifice were predominant characteristics of the early leaders of the Industrial Revolution.[101] Indeed it has been observed that 'Industrial capital has been its own chief progenitor'.[102] Certainly this was the case at Dowlais where such ideals may well have been adhered to more strictly and for far longer than elsewhere. The consequence was that recourse to the joint stock company structure, increasingly adopted by other iron making establishments after 1844[103] in order to fund capital outlay, was unnecessary at Dowlais.

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[92] Annual Report 1868, pp. 2–3, GRO D/DG, E3(ii).

[93] Information contained in the Annual Reports and the letter from Rate to the Trustees, 26 July 1860, GRO D/DG, E2, provide further clues to the vast amount of quantitative data generated at DIC for management control purposes.

[94] Some discussions of the contribution of Clark and Menelaus are contained in *A Short History of the Dowlais Iornworks*, pp. 35–48, and C. Wilkins, *History of the Iron, Steel, Tinplate and Other Trades of Wales*, Joseph Williams, 1903, pp. 290–292 and 303–313.

[95] Total cost £81,361, Annual Report 1867, p. 27b, GRO D/DG, E3(ii).

[96] Total cost to 1883 £131,000, 'Chronological Date Sequence of Events for the Dowlais Ironworks', p. 14.

[97] Acquired in 1859, it gave DIC access to supplies of high quality coal, Annual Reports 1860 & 1861 at pp. 7–8 and p. 3 respectively, GRO D/DG, E(ii).

[98] *Report on the Dowlais Works—14 November 1857.*

[99] Dowlais held a 25% interest in the Orconera Iron Ore Company.

[100] Losses incurred during the 1850s resulted in a debit balance on the profit and loss account of £52,908 at 31 March 1856. Although £129,423 was expended on New Work and written off during the next four years, the company succeeded in reporting a profit of £61,243 which absorbed the loss brought forward and produced a credit balance of £8,335 at 31 March 1860.

[101] *The Crawshay Dynasty*, p. 155.

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Appendix A

Some Financial Totals 1831–1890

Year to March:	*Profit divided (Note 1)* £	*Profit added to capital* £	*Total profit* £	*Capital Stock (Note 2)* £	*New Work (Note 3)* £
1831	17,221		17,221	117,543	818
1832	16,613		16,613	117,543	896
1833	19,195	2,457	21,652	120,000	5,495
1834	48,000	6,096	54,096	126,096	2,734
1835	48,000	3,836	51,836	129,932	1,228
1836	52,643	15,068	67,711	145,000	3,778
1837	99,160	30,000	129,160	175,000	3,894
1838	77,413	18,511	95,924	193,511	1,275
1839	85,024	6,489	91,513	200,000	20,000
1840	78,066		78,066	200,000	27,489
1841	47,293		47,293	200,000	24,088
1842	55,206		55,206	200,000	11,330
1843	15,335		15,335	200,000	
1844	31,157		31,157	200,000	5,809
1845	59,039		59,039	200,000	
1846	129,070	30,000	159,070	230,000	21,919
1847	162,747	10,000	172,747	240,000	15,198
1848(Year end May)	104,827		104,827	240,000	
1849	15,768		15,768	535,200	14,128
1850	3,778		3,778	503,200	33,781
1851	(32,306)		(32,306)		31,259
1852			(19,720)		21,285
1853			(96)		4,628

(continued overleaf)

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[102] T. S. Ashton, *The Industrial Revolution 1760–1830*, Oxford University Press, 1954, p. 97.

[103] *The Economic History of the British Iron and Steel Industry*, c. x.

Appendix A (continued)

Year to March:	*Profit divided (Note 1)* £	*Profit added to capital* £	*Total profit* £	*Capital Stock (Note 2)* £	*New Work (Note 3)* £
1854			44,029		5,326
1855			16,916		25,386
1856			(52,908)		41,491
1857			12,461		27,368
1858			(41)		38,634
1859			17,940		24,604
1860			30,883		38,817
1861			8,833		20,708
1862			3,060		25,311
1863			36,572		30,897
1864			38,111		24,043
1865			104,843		32,664
1866			62,503		24,695
1867			96,737		11,277
1868 (Year end April)			86,014		5,985
1869			109,036		7,553
1870			197,756		16,638
1871			165,840		29,846
1872			229,836		22,523
1873			190,514		49,868
1874			253,516		44,556
1875			49,130		43,699
1876			45,713		39,199
1877			81,009		43,179
1878			68,145		22,860
1879			94,010		27,477
1880			143,872		27,386
1881			139,030		43,887
1882			192,441		61,983
1883			137,010		31,587
1884			70,776		27,268
1885			62,205		47,352
1886			52,565		55,175
1887			33,644		27,416
1888			39,480		37,574
1889			85,172		30,901
1890			177,360		
			£4,359,903		£1,366,165

Notes: (1) E. J. Hutchins withdrew from the partnership on 31 March 1851; profits subsequently earned belonged entirely to Sir Josiah John Guest and later the beneficiaries under his will.

(2) From 1850 onwards the capital Stock remained unchanged at £503,200.

(3) No figure is available for 1890.

Appendix B

Some Prominent Owners, Trustees and Employees of DIC

H. A. Bruce, Lord Aberdare, Trustee under Sir John's will.

G. T. Clark, resident trustee; he played a full part in the management of DIC.

John Evans, General Manager of the Works, 1821–1856.

Thomas Evans, John Evans' brother. As a Dowlais agent he travelled overseas, including a trip to Russia.

Lady Charlotte Guest, second wife of Sir John, managing trustee of DIC from 1852 until her remarriage in 1856 to Charles Schreiber.

Sir Ivor Bertie Guest, Lord Wimborne, eldest son of Sir John and Lady Charlotte.

Sir Josiah John Guest, partner and later sole proprietor of DIC; also responsible for overall management of the concern 1814–1852.

E. J. Hutchins, nephew of Sir John and shareholder in the Works. Involved in the management of the Works for a number of years before selling his two-sixteenth shareholding to his uncle in 1851. He then became Chairman of the Rhymney Iron Company.

D. James, responsible for preparing the Annual Reports from 1871 onwards.

W. Jenkins, book-keeper and later accountant at DIC between 1846 and 1869 when he joined the Consett Iron Company.

G. Kitson, sales representative and manager at London House.

Wyndham William Lewis, great-grandson of Thomas Lewis, founder of DIC. Sold his five-sixteenth shareholding to Sir John in 1848.

William Menelaus, general manager of the Works, 1856–1882.

H. A. Rate, employed in a financial capacity at London House.

J. Walkinshaw, accountant at the Works, resigned 1857.

W. Wood, a mill manager during the late 1840s and early 1850s.

Segmentation and the Audit Process

David Hatherly

The auditor faced with an audit population which he wishes to test substantively on a sample basis may subdivide the population by size (stratification) and by error risk. The term segmentation is used in this article to describe the segregation of items (or monetary units) in the population into groups according to their error risk. Frequently a subdivision according to risk corresponds to a subdivision according to the systems of internal control which have generated the output, since different systems have different risk characteristics. By stratification and segmentation the auditor can concentrate his examination on those items which are material either due to size or possibility of error.

Monetary unit sampling plans are equivalent to upper boundary priced physical unit sampling with an infinite degree of stratification [1] and, therefore, such plans automatically stratify the population. They do not, however, incorporate segmentation and for this reason monetary unit sampling has been criticised by Smith [2] who comments that such plans do not make explicit use of any knowledge about key areas that might be prone to error. Indeed it is the practice of one leading UK accounting firm to combine the balance of individual accounts for monetary unit sampling, and this may reduce the auditor's ability to give more weight to key areas.

The following paragraphs are designed to investigate the importance of segmentation as a part of the audit strategy and hence to examine the significance of these criticisms of monetary unit sampling plans. The criticisms are found to be valid in the sense that the efficiency of monetary unit sampling may be improved if the error prone sections of the population are separately identified and given separate consideration in the sample.

Examining the efficiency of monetary unit sampling

The efficiency of monetary unit sampling is examined under the following eight conditions:

(1) *Monetary Unit Sampling as an Initial Sample*

It has been shown by Kaplan [3] that if a monetary unit sampling plan is designed to control the alpha risk (risk of rejecting a materially correct population) as well as the beta risk (risk of accepting a materially incorrect population) then far larger sample sizes are required than those typically employed by the auditor. In practice the auditor adopts a two stage approach with the first stage being an initial sample designed to control the beta risk only. In the event of the auditor being unable to accept the population on the basis of the initial sample result, he conducts further audit work which is likely to be in the specific areas suggested by a study of the errors obtained in the sample, rather than a general increase in sample size. This article investigates monetary sampling when used as an 'initial' sample to control the beta risk only.

(2) *Monetary Unit Sampling as a Discovery Sample*

The size of the initial sample may be chosen on the basis of expected error rates and the required beta risk. If the error rate discovered in the sample does not exceed expectations, the auditor can accept the population as the beta risk is satisfied. However, if the error rate in the sample exceeds expectations, the auditor cannot accept the population and further audit work must be performed. An alternative to varying the initial sample size on the basis of expected error rate is to select a discovery sample, whatever the expected error rate. The auditor can then only accept populations on the basis of the sample result alone, when no errors are discovered in the sample and the effect is to increase the frequency of occasions when further audit work must be conducted, although there is, of course, the benefit of smaller initial samples. When used as a discovery sample, the purpose of monetary unit sampling is to 'assure that at least one instance of every material type of error in the population occurs in the sample so that the auditor's attention will be directed to the problem area' [4].

This article investigates monetary unit sampling when used as a discovery sample.

(3) *Two Segments*

It is assumed that the population divides into two sections or segments (one error prone and the other not).

(4) *Two Strategies*

There are two ways in which the division of the population into two segments can be given consideration in the monetary sample:

(i) Total sample size is allocated between segments proportionally according to the number of population units in each, and separate random samples are selected.

(ii) Total sample size is allocated between segments according to their risk characteristics. A proportionally larger sample is allocated to the higher risk segment and separate random samples are selected.

Strategy 1 may be thought of as a 'passive' and strategy 2 as an 'active' strategy. The conventional monetary sampling strategy is to take one unrestricted sample from the entire population, and to demonstrate the validity of the criticism that such a strategy does not allow the auditor to give more weight to error prone areas, the efficiency of samples selected on a conventional basis (the conventional strategy) is compared with the efficiency of samples of the same size selected under strategies 1 and 2.

(5) *Probabilities Calculated to Indicate Efficiency*

The efficiency of each of the strategies is indicated by the calculated probability (P) of the sample failing to detect even a single error given that there is material error in the population (the higher this probability, the less the efficiency of the sampling strategy).

Suppose

a_1 is the proportion of the sample in segment 1
b_1 is the proportion of the population in segment 1 [5]
c_1 is the proportion of total error in segment 1
n is total sample size
e is error rate in the population
N is population size (large).

then

total error is	eN
error in segment 1 is	c_1eN
population in segment 1 is	b_1N
sample allocated to segment 1 is	a_1n

probability of failure to discover an error in segment 1 is

$$\left(1-\frac{c_1e}{b_1}\right)^{a_1n}$$

probability of failure to discover an error in either segment 1 or 2 is

$$\left[\left(1-\frac{c_1e}{b_1}\right)^{a_1n}\right]\times\left[\left(1-\frac{c_2e}{b_2}\right)^{a_2n}\right] \qquad \text{Formula 1}$$

where

$$a_1+a_2=1$$
$$b_1+b_2=1$$
$$c_1+c_2=1$$

Formula 1 provides the basis of the calculated probabilities [6].

(6) *Investigation of the Passive Strategy (Strategy 1)*

The efficiency of strategy 1 can be studied by putting $a_1 = b_1$ in formula 1, i.e., the proportion of the sample in segment 1 equals the proportion of the population in segment 1. The probability of strategy 1 failing to detect a single error is calculated for different values of b_1, and for different values of c_1. b_1 is varied from the position where the auditor considers only a relatively small proportion of the population to be error prone ($b_1 = 0{\cdot}1$) to the position where a large proportion is considered to be error prone ($b_1 = 0{\cdot}9$). c_1 is varied from the position where the segmentation is completely inaccurate in the sense that none of the error is actually in the segment considered by the auditor to be error prone ($c_1 = 0$) to the position where the error is in fact all contained in the segment of the population identified by the auditor ($c_1 = 1$). In both these cases the auditor correctly assesses the boundary of the segment which contains all the error. Intermediate values of c_1 arise whenever the auditor incorrectly assesses the boundary of the segment which contains the error, or where the auditor attempts to segment a population which is not susceptible to segmentation because the error is distributed evenly throughout.

(7) *Investigation of the Active Strategy (Strategy 2)*

The efficiency of strategy 2 can be studied by putting $a_1 > b_1$ whenever the auditor considers segment 1 to be error prone. The auditor biases sample allocation towards the error prone segment and the effect of changing the bias is studied by changing the ratio (a_1:b_1) for given values of b_1 and c_1. The ratio is varied from the position

Table 1
Results of the Investigation of the Passive Strategy

c_1 \ a_1, b_1	0·1	0·3	0·5	0·7	0·9
0	0·1323	0·1315	0·1299	0·1262	0·1074
0·1	0·1326	0·1321	0·1309	0·1279	0·1125
0·2	0·1323	0·1325	0·1316	0·1293	0·1171
0·3	0·1314	0·1326	0·1322	0·1305	0·1212
0·4	0·1298	0·1325	0·1325	0·1314	0·1247
0·5	0·1276	0·1321	0·1326	0·1321	0·1276
0·6	0·1247	0·1314	0·1325	0·1325	0·1298
0·7	0·1212	0·1305	0·1322	0·1326	0·1314
0·8	0·1171	0·1293	0·1316	0·1325	0·1323
0·9	0·1125	0·1279	0·1309	0·1321	0·1326
1·0	0·1074	0·1262	0·1299	0·1315	0·1323

of slight bias toward the segment considered error prone

$$\left(\frac{a_1}{b_1} = 1{\cdot}2\right)$$

to the position of considerable bias

$$\left(\frac{a_1}{b_1} = 3{\cdot}2\right).$$

(8) *Error Rate and Sample Size*

The investigation of strategies 1 and 2 studies their efficiency in detecting, through a sample of 100, a single error in a population which has a material error rate of 0·02. Although the effect of changing a_1, b_1, c_1 and $a_1{:}b_1$ is studied, e and n are held constant at 0·02 and 100 respectively [7].

Table 1 gives the calculated probabilities (P) for different values of b_1 and c_1. The following comments are supported by the figures shown in the table:

(i) The probability given by strategy 1 is never more than the probability given by a single unrestricted sample of the same size. (The probability given by the unrestricted sample is $(1 - 0{\cdot}02)^{100} = 0{\cdot}1326$). Hence strategy 1 is never less efficient than the conventional strategy in a statistical sense, although whether it would be preferred by the auditor does, of course, depend upon the costs of segmentation.

(ii) It is intuitively sensible that when the proportion of total error contained in the segment equals the proportion of the population in the segment ($c_1 = b_1$), segmentation is ineffective and Table 1 confirms that the efficiency of strategy 1 is no greater than the efficiency of the conventional strategy when $b_1 = c_1$ [8].

(iii) The efficiency of strategy 1 increases as the divergence between b_1 and c_1 increases. The best result (P = 0·1074) is obtained when all the error is contained in a small segment of the population ($c_1 = 1$, $a_1 = b_1 = 0{\cdot}1$). The direction of the divergence is of no consequence, and the same result (P = 0·1074) is obtained when $c_1 = 0$, $a_1 = b_1 = 0{\cdot}9$ [9].

These are the only two cases where strategy 1 appears to be a significant improvement on the conventional strategy. (P = 0·1074 against 0·1326.)

(iv) There is a trade-off between b_1 and c_1 in most practical situations where the auditor employs passive segmentation as part of his audit strategy. For example, he may feel that the distribution of error is such that 80% is contained in 10% of the population and 100% is contained in 30% of the population. If he wishes to restrict the number of segments to 2, then the auditor can see from Table 1 that a strategy based on $c_1 = 0{\cdot}8$, $b_1 = 0{\cdot}1$ (P = 0·1171) is preferable to a strategy based on $c_1 = 1$, $b_1 = 0.3$ (P = 0·1262). Tables such as Table 1 can assist the auditor in his planning process.

Table 2 gives the calculated probabilities (P) for different values of

$$b_1, \frac{a_1}{b_1}, c_1.$$

The following comments are supported by the figures shown in the table:

(i) It is intuitively sensible that biasing should be an effective strategy whenever the proportion of error in the segment exceeds the proportion of the population in the segment ($c_1 > b_1$), and the figures in table 2 confirm that strategy 2 is more efficient than strategy 1 whenever $c_1 > b_1$. In table 2, for example, when $c_1 = 0{\cdot}4$, $b_1 = 0{\cdot}3$ and $a_1/b_1 = 1{\cdot}2$ then P = 0·1250 which is less

Table 2
Results of the Investigation of the Active Strategy

b_1 \ a_1/b_1	1	1·2	1·6	3·2
	(strategy 1)	(strategy 2)		
	$c_1 = 0$			
0·1	0·1323	0·1384	0·1514	0·2169
0·3	0·1315	0·1564	0·2215	0·8905
0·5	0·1299	0·1954	0·4420	N/A
0·7	0·1262	0·3316	N/A	N/A
0·9	0·1074	N/A	N/A	N/A
	$c_1 = 0·1$			
0·1	0·1326	0·1326	0·1326	0·1326
0·3	0·1321	0·1484	0·1872	0·4741
0·5	0·1309	0·1814	0·3486	N/A
0·7	0·1279	0·2922	N/A	N/A
0·9	0·1125	N/A	N/A	N/A
	$c_1 = 0·4$			
0·1	0·1298	0·1128	0·0853	0·0278
0·3	0·1325	0·1250	0·1112	0·0697
0·5	0·1325	0·1438	0·1693	N/A
0·7	0·1314	0·1982	N/A	N/A
0·9	0·1247	N/A	N/A	N/A
	$c_1 = 0·5$			
0·1	0·1276	0·1057	0·0725	0·0161
0·3	0·1321	0·1175	0·0930	0·0364
0·5	0·1326	0·1326	0·1326	N/A
0·7	0·1321	0·1736	N/A	N/A
0·9	0·1276	N/A	N/A	N/A
	$c_1 = 1$			
0·1	0·1074	0·0687	0·0281	0·0008
0·3	0·1262	0·0834	0·0365	0·0013
0·5	0·1299	0·0864	0·0382	N/A
0·7	0·1315	0·0876	N/A	N/A
0·9	0·1323	N/A	N/A	N/A

than 0·1325, the result obtained in the same circumstances but using strategy 1.

(ii) Similarly, whenever $c_1 < b_1$, table 2 demonstrates that strategy 2 is less efficient than strategy 1. For example, when $c_1 = 0·4$, $b_1 = 0·5$ and $a_1/b_1 = 1·2$, then P = 0·1438, which is more than 0·1325, the result given by strategy 1.

(iii) It is intuitively sensible that biasing is of no consequence whenever the proportion of the error in the segment equals the proportion of the population in the segment ($c_1 = b_1$) and table 2 confirms that whenever $b_1 = c_1$, strategies 1 and 2 are equally efficient (P = 0·1326), and give the same result as the conventional strategy.

(iv) From table 2 it can be seen that:

(a) the efficiency of strategy 2 improves (value of P declines) as the value of b_1 declines [10].

(b) the efficiency of strategy 2 improves as the value of c_1 increases [10].

(c) *whenever* $c_1 > b_1$, biasing improves the efficiency of strategy 2 *and whenever* $c_1 < b_1$ biasing causes the efficiency to decline. For example, when $c_1 = 0·4$ and $b_1 = 0·3$, increasing a_1/b_1 from 1·2 to 1·6 causes P to fall from 0·1250 to 0·1112. However, when $c_1 = 0·4$ and $b_1 = 0·5$, a similar increase in the bias causes P to rise from 0·1438 to 0·1693.

(v) Since biasing can produce both very good and very poor results depending on whether, and to what extent, c_1 is greater than b_1, the auditor should only bias his sample when he is confident that $c_1 > b_1$. As the auditor increases the bias, there is a trade off between the possibility of significantly improved results (when the auditor is correct in his assessment of $c_1 > b_1$) and the possibility of significantly worse results (where the auditor is incorrect in his assessment). For example, if the auditor considers that all the error is in 30% of the population ($c_1 = 1$, $b_1 = 0·3$), a strategy which biased the sample so that $a_1/b_1 = 3·2$, gives a value of P = 0·0013 assuming the auditor is right, and a value of P = 0·8905 assuming he is completely wrong ($c_1 = 0$). Although the auditor may be confident in his assessment of $c_1 > b_1$ he may consider that the possibility of such a large value for P, even though remote, is unacceptable. He may, therefore, opt for a smaller bias (say $a_1/b_1 = 1{\cdot}6$) where the value of P, assuming the auditor is completely wrong in his assessment, is considerably reduced (from 0·8905 to 0·2215). Tables such as Table 2 can assist the auditor to decide the appropriate degree of bias for his sample.

Conclusion

The calculated probabilities of Table 1 demonstrate that segmentation can, in the circumstances considered, increase the efficiency of monetary unit sampling, and Table 2 indicates that biasing the sample toward the anticipated error prone segment can improve the efficiency still further. In order to be able to adopt either the passive or active strategies the auditor must be able to segment the population according to risk characteristics. However, if he is wrong in his assessment of the risk characteristics the consequences for the active strategy are potentially far more serious than for the passive strategy. Consequently when the auditor adopts the active strategy he must be confident of his assessment of the error prone segment and rather more time must be spent in the presegmentation phase than is necessary for the passive strategy. Clearly the final choice of strategy will depend upon the auditor's subjective cost-benefit analysis of the costs of segmentation and the benefit of improved results. However, the article does demonstrate that it is reasonable to assume that in certain circumstances at least the benefits of segmentation are significant. Those who criticise conventional monetary unit sampling plans for not giving weight to error prone areas of the population have a point.

References

[1] Anderson, R., and Teitlebaum, A. D., 'Dollar Unit Sampling', *C A Magazine*, April 1973, p. 36.

[2] Smith, T. M. F., *Statistical Sampling for Accountants*, Accountancy Age, 1976, p. 236.

[3] Kaplan, R. S., 'Sample Size Computations for Dollar Unit Sampling', *Journal of Accounting Research*, 1975 Supplement, pp 126–133.

[4] Moriarity, S., 'Discussion of Decision Theory Aspects of Internal Control System Design/Compliance and Substantive Tests', *Journal of Accounting Research*, (1975 Supplement), p 33.

[5] The ratio $b_1{:}1\text{-}b_1$ is termed the 'segmentation ratio'.

[6] The probabilities were calculated using a programmable calculator for which formula 1 was rewritten:

$$\left[\left(1-\left(\frac{c_1e}{b_1}\right)\right)^{(a_1n)}\right]\times\left[\left(1-\left(\frac{(1-c_1)e}{(1-b_1)}\right)\right)^{((1-a_1)n)}\right]=\mathrm{P}$$

[7] The author calculated the values of p using a different set of values for e and n (0.08 and 50), and this was found not to affect the form of the results, although individual values for p were considerably lower.

[8] This situation occurs, for example, when the auditor segments a population which has the error spread evenly throughout.

[9] It is interesting to note that where the segmentation ratio is high (0·9), the best result is obtained when the auditor is completely wrong in his assessment of which segment contains the error ($c_1 = 0$). This serves to emphasise that it is not the value of c_1 which determines efficiency but the divergence between c_1 and b_1.

[10] This is not necessarily the case for strategy 1.

An Experimental Study of the Differential Effect of Standard and Qualified Auditors' Opinions on Investors' Price Decisions

Ralph Estes and Marvin Reimer

> In most cases today, the intended effect of the auditor's report is not clear and the effects it does produce are not well known. More consideration needs to be given to this area and greater research needs to be performed.
>
> *A Statement of Basic Auditing Concepts* (American Accounting Association), p. 52

The standard auditor's opinion is widely perceived as adding credibility to financial statements.[1] Qualified opinions call the reader's attention to material exceptions or uncertainties, and may provide more extensive explanations than those contained in the financial statements and footnotes.

Does the auditor's opinion have any other effects? Suppose, for example, that an investor has studied the financial statements and footnotes thoroughly, and has integrated this information into his or her decision model. The statements are not in conformity with a generally accepted accounting principle; nonconformity is thoroughly explained in a footnote, and the investor takes careful note of the nonconformity and its effects on the statements, earnings per share, and price earnings ratio. Would that investor behave differently—would his or her decisions be different—if those statements were accompanied by a qualified opinion instead of a standard opinion? In other words, does the type of auditor's opinion—standard or qualified—have an effect on readers' decisions which is separate from the effect of the information in the financial statements? Does the auditor's choice of wording for his opinion affect investors' attitudes and decisions, beyond any effect information about the company's actual performance and position may have?

This is obviously not a trivial question. The auditor seeks, in rendering his opinion on financial statements, to insure that the reader is fairly informed by those statements. When the auditor believes the statements do not achieve fair presentation, in conformity with generally accepted accounting principles, he qualifies his opinion so that the total package of information provided the reader—statements and auditor's opinion—will not be misleading. But does the auditor seek to influence the client company's acceptance by investors, or the banker's decision as to whether to grant the client a loan? Surely not, and yet auditors must wonder what effect their opinions will have on their clients' fortunes.

In an earlier article we reported the results of research into the reactions of bankers to a qualified opinion in making loan decisions.[2] Here we report the results of a related study to obtain evidence about the differential effect of auditors' opinions on financial analysts' decisions.

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[1] See, for example, D. R. Carmichael, *The Auditor's Reporting Obligation* (New York: AICPA, Auditing Research Monograph 1, 1972), pp. 1–2; and Committee on Basic Auditing Concepts, *A Statement of Basic Auditing Concepts* (Sarasota: American Accounting Association, 1973), p. 13.

[2] Ralph Estes and Marvin Reimer, 'A Study of the Effect of Qualified Auditors' Opinions on Bankers' Lending Decisions', *Accounting and Business Research*, Autumn 1977, pp. 250–259.

While several audiences for financial statements exist, investors are certainly among the most important.[3] Financial analysts not only invest on behalf of their own companies and accounts, but advise many other investors. Because of their critical positions, their investment decisions undoubtedly have a disproportionate effect on the market. Because of their impact on market prices, because of their sophistication in financial reporting matters, and because of the attention they command from corporate officers, financial analysts were chosen as the subjects for our experiment on the differential effects of auditors' opinions on investment decisions.

Prior research

No prior research was found which investigated the differential effects of alternative audit opinions on decisions of financial statement users. Prior research has tended to focus on the extent of audit opinion readership, role and responsibilities of the external auditor, meaning of phrases in the audit opinion, and effect of placement of the opinion. This research was reviewed in our earlier article, and was summarised as follows:

> Information appears to be retained equally well when it is disclosed in the auditor's report or in a footnote to the financial statements; there is no consensus on the meaning of 'present fairly... in conformity with GAAP'; the auditor's report is not considered by stockholders to be particularly useful, and it is not even read by a significant percentage; bankers and financial analysts are somewhat more interested in the auditor's report; and considerable confusion exists as to the responsibility of the external auditor.[4]

Research methodology

The null hypothesis to be tested was stated as follows:

> H_0: There is no significant difference between the price estimates by financial analysts for shares of companies whose financial statements are accompanied by an unqualified audit opinion and those whose statements have a qualified, 'except for' audit opinion.

The alternative hypothesis was:

> H_a: Price estimates by financial analysts for shares of companies whose financial statements are accompanied by an unqualified audit opinion differ significantly from those for shares of companies whose statements are accompanied by a qualified, 'except for' opinion.

A controlled experiment methodology was selected, with a control group of subjects to receive a financial statement package including a standard, unqualified opinion and a test group to receive exactly the same package but with an 'except for' opinion.

It should be noted that the important concern, in testing the impact of differential audit opinions, is whether any differential decisions are based primarily on (1) *the information forming the basis for the auditor's exception*, or (2) *the different form of opinion*. While there is probably no way of completely eliminating this possible confounding effect, it may be reduced and partially controlled. Our approach was to choose, on the basis of prior interviews with financial analysts, a form of noncompliance with generally accepted accounting principles that would have the least possible impact on investors' decisions. The exception chosen was noncompliance with Accounting Principles Board Opinion No. 18.[5]

This opinion requires the use of the equity method for reporting certain investments, while our reporting company used the more conservative cost method.

APB Opinion 18 was chosen because we wanted a relatively benign exception; that is, we were seeking to determine the differential effect of different forms of the auditor's opinion, holding the basis for the exception constant between control and test groups, and we did not want to use an exception which would possibly have a particularly serious effect on the financial analysts' decisions and thus possibly cloud the effect of the different opinion form. Ideally we would have used a departure from generally accepted accounting principles that would have had no effect whatsoever on the reader, leaving the entire difference in decision responses traceable to the audit opinion form. No such departure exists, but we believe APB Opinion 18 comes as close as possible to this goal, since in our pretest several analysts described this as a 'technical' requirement of more importance to accountants than to analysts.

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[3] Investors have been characterised as ranging from naive to sophisticated in their understanding of financial reporting. We hope to research unsophisticated investors at a later date; for the present study we concentrated on the sophisticated investor.

[4] *Ibid*, p. 251.

[5] Opinion 18 of the Accounting Principles Board requires the use of the equity method in accounting for investments in common stock when the investment gives the reporting company the ability to exercise significant influence over operating and financial policies of the investee even though the investor holds 50% or less of the voting stock; ownership of 20% or more of the voting stock of an investee leads to the presumption that in the absence of evidence to the contrary the investor has the ability to exercise such significant influence. The equity method calls for adjustment of the carrying amount of the investment to recognise the investor's share of the earnings or losses of the investee after the date of acquisition. See Accounting Principles Board Opinion No. 18, *The Equity Method of Accounting for Investments in Common Stock* (American Institute of Certified Public Accountants, March 1971).

To reach an adequate number of financial analysts in a short period of time, the experiment was conducted by mail. This approach has the disadvantages of nonresponse and possible misunderstandings by participants. It has the advantages of reaching an appropriately chosen sample and of permitting participants adequate study and response time.

A research instrument was designed consisting of the following:

A covering letter, with a section for a response. Specifically, subjects were asked to indicate the price which 'most nearly reflects your opinion as to the price at which XYZ common stock would represent an attractive investment'
Descriptive information about the XYZ Company
Auditor's opinion—unqualified for the control group, 'except for' qualification for the test group
Consolidated balance sheets (3 years)
Statements of consolidated income and retained earnings (3 years)
Statements of changes in consolidated financial position (3 years)
Notes to consolidated financial statements

The control group and test group versions of the auditor's opinion and Footnote 2 to the financial statements (which was the same for both control and test groups) are reproduced in the Appendix. The full set of financial statements and accompanying footnotes may be found in the Appendix to our report on the study of bankers' reactions.[6]

The financial statements were developed for the hypothetical XYZ Company by taking the averages of five real manufacturers of household products. Relatively neutral data were desired so the decision maker would not be distracted from the response task by atypical values; hence the XYZ Company shows healthy current ratios, a good capital distribution between debt and equity, normal investment accounts, a moderate earnings growth rate, and generally good turnover ratios.

The footnotes to the financial statements reveal a material but 'technical' departure from APB Opinion 18, in that XYZ Company carries investments in 25% of the outstanding shares of certain retail outlets at cost instead of on the equity basis. This departure results in somewhat more conservative statements.

The Membership Directory of the Financial Analysts Federation was used to select 1,000 financial analysts. Selection was restricted to those members in the United States with functional specialties indicating at least some expertise in financial statement use and analysis; the specialties used were Investment Counselor, Portfolio Manager, Generalist, and Director of Research. Roughly 3,000 members indicated such specialties; systematic random sampling was used to select 1,000 of these. Every other member selected was mailed a packet with the qualified auditor's opinion; the remaining analysts constituted a control group and received a packet with an unqualified opinion. *All analysts received the same financial statements, footnotes, descriptive information, and covering letter.* Consequently all analysts were provided with full disclosure concerning the APB Opinion departure. The only variable was the auditor's opinion.

Response decisions could be expected to be somewhat time dependent since economic conditions are constantly changing. For this reason we did not use a follow-up mailing for those failing to respond. Since we were concerned about the possible contaminating effect of intervening environmental events during the two month period in which responses were received, we performed a test to seek to identify any such effect. Control group responses and test group responses were each divided into two roughly equal groups on the basis of date received. A t-test was then performed on the mean price responses of the early vs. later responses. The difference between early mean response and later mean response was not significant for either the control or the test groups. This rather weak test fails to indicate that intervening environmental events had any significant effect on the subjects' price responses. It also provides limited support for the conclusion that the responses are representative of the entire group sampled including nonresponding subjects, since later responses are assumed to be somewhat more representative (than the earlier responses) of the views of nonrespondents.

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[6] Estes and Reimer, *op. cit.*

To determine whether the control and the test groups differed in their propensity to participate in the experiment, a response rate test was made.[7] The control group response rate was 92/500, or 0.18; the test group rate was 106/500, or 0.21. The difference between these two rates is not statistically significant (0.05 significance level), and consequently we do not conclude that the control and test groups differed in their propensity to participate in the experiment.

Results

Results of the experiment may be summarised as follows:

	Control Group-Unqualified Opinion	*Test Group-Qualified Opinion*
Mean price response	\$17.27	\$15.33
Standard deviation	\$6.29	\$5.95
Range	\$2–\$30	\$4–\$30
n	106	92

To determine whether the mean price responses are significantly different, the following t-test was made:

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\hat{\sigma}_{\bar{x}_1 - \bar{x}_2}} = \frac{(17.2736 - 15.3261)}{0.8765}$$

$$= 2.2218 \text{ (196 degrees of freedom)}$$

At our preselected significance level of 0.05, the difference in means is statistically significant. The null hypothesis is rejected and the alternative hypothesis is accepted. Using a one-tailed test, the probability that the difference could occur in samples from populations with the same mean is only 0.013; with a two-tailed test, 0.026.

To determine whether the two groups differ significantly in the variances of their price responses, an F-test was made. An F value of 1.1181, with 105 and 91 degrees of freedom, was obtained; thus we do not conclude that the variances are significantly different (0.05 significance level) between the control and test groups.

Limitations of the study

This study investigated the differential effect of two types of audit opinions—unqualified and qualified with respect to conformity with generally accepted accounting principles. The results cannot be generalised to other forms of audit opinions (subject to, adverse, disclaimer).

Financial analysts were used as subjects in the experiment, and only a subset of financial analysts at that—those with functional specialties indicating expertise in using financial statements. The results of the experiment cannot, therefore, be taken as representative of the effect of an 'except for' opinion on all users of financial statements. For example, the effect might be insignificant for unsophisticated users. Tempering this factor, however, is the likelihood that the experts used as subjects in this experiment exert an influence on investment decisions of their firms, their clients, and the general public far out of proportion to their numbers.

The experiment was conducted by mail and thus was subject to the limitations of a mail survey. Although our test of early vs. later responses provides limited assurance that responses were representative of the entire population sampled, there is a possibility of nonresponse bias.

Conclusion

This article reports on a controlled experiment performed by mail, using, as subjects, financial analysts with indicated expertise in financial analysis. Analysts were assigned randomly to control and test groups. The control group received financial statements with accompanying footnotes, a description of the company, and an unqualified CPA's opinion. The test group received the same packet except that the CPA's opinion was qualified for noncompliance with APB Opinion 18. The noncompliance was fully explained in statement footnotes received by both groups.

The mean price response of the control group was \$17.27; that of the test group was \$15.33. The difference is significant at the 0.05 level, and the following alternative hypothesis is therefore accepted:

> Price estimates of financial analysts for shares of companies whose financial statements are accompanied by an unqualified audit opinion

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[7] Croxton, Crowden, & Klein, *Applied General Statistics* (Englewood Cliffs: Prentice-Hall, Inc., 3rd ed., 1967), p. 585.

differ significantly from those for shares of companies whose statements are accompanied by a qualified, 'except for' opinion.

This conclusion differs from that reached in the study of bankers cited earlier;[8] the null hypothesis was not rejected in that study. Such results must be interpreted with caution, of course. We can say precisely that there is less than one chance in twenty that the difference between mean responses of financial analysts, for those given standard opinions and those given 'except for' opinions, could be as great as we obtained if the different opinions in fact have no differential effect. In the bankers' study, the difference between mean responses *relative to the standard error of the means* was not so great that it could not be attributed to chance. Thus the present study strongly supports the conclusion that an 'except for' auditor's opinion has a negative or depressing effect on the evaluation of the reporting company's stock made by financial analysts. The study of bankers does not support such a conclusion.

The difference in results between these two studies may be due to the use of different decision models and analytical approaches by bankers in making their loan decisions and by financial analysts making investment (or investment recommendation) decisions; in this case the 'except for' opinion would appear to make a difference to financial analysts but not to bankers. Alternatively, it may be that bankers are also influenced negatively by the 'except for' opinion but this result did not surface in our earlier study because of the variability in the bankers' responses and the resulting relatively large standard error of the means. At this point it is not possible to choose between these alternative interpretations, but it is likely that the issue can be resolved by a succeeding study of bankers using a larger sample.[9]

Based on the results of this study, we conclude that the qualified 'except for' auditor's opinion produces a negative effect on financial analysts' attitudes toward the reporting company, quite apart from the effect of the information describing the basis for the exception. The auditor's opinion is not merely a conveyor of information; its form is a separate stimulus in the decision models of informed investment-oriented users of financial statements.

Appendix

Auditor's Opinion (Control Group)

To the Board of Directors, XYZ Company:

We have examined the consolidated balance sheets of XYZ Company as of September 30, 1973 and 1974, and the related consolidated statements of income and retained earnings and changes in financial position for the years then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the aforementioned financial statements present fairly the financial position of XYZ Company at September 30, 1973 and 1974, and the results of its operations and changes in its financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Center City — Smith & Jones
October 15, 1974 — Certified Public Accountants

Auditor's Opinion (Test Group)

We have examined the consolidated balance sheets of XYZ Company as of September 30, 1973 and 1974, and the related consolidated statements of income and retained earnings and changes in financial position for the years then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, except for the failure, described in footnote 2, to account for investments by the equity method as required by Accounting Principles Board Opinion No. 18, the aforementioned financial statements present fairly the financial position of XYZ Company at September 30, 1973 and 1974, and the results of its operations and the changes in its financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Center City — Smith & Jones
October 15, 1974 — Certified Public Accountants

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[8] Estes and Reimer, *op. cit.*

[9] Our research into the differential effects of auditors' opinions is continuing, and we hope to ultimately investigate the effects of all forms of opinions on several audiences.

Footnote #2 to Financial Statements

2. *Investments*

Investments in common stock of certain retail outlets, representing approximately 25% of the outstanding shares, are carried on the cost method. While APB Opinion No. 18 calls for use of the equity method for such investments, the Company is of the opinion that these investments are more conservatively reported by the cost method. Use of the equity method would have resulted in the following increases:

	1974	*1973*	*1972*
Investments	$6,250,000	$6,250,000	$5,000,000
Deferred Income Tax Liability	450,000	450,000	360,000
Retained Earnings	5,800,000	5,800,000	4,640,000
Net Income	6,250,000	6,250,000	5,000,000
Earnings per Share	$0.88	$0.88	$0.72

Walter Taplin Prize

The Association of University Teachers of Accounting, the Council of Departments of Accounting Studies and *Accounting and Business Research* offer a prize of £75 for the best article published in each annual volume. The prize is named in honour of the journal's founding editor, Walter Taplin.

The winning article is chosen by the subscribers. Their choice in 1976/77 was Edward Stamp, *ED 18 and Current Cost Accounting: A Review Article* (Spring 1977).

Forthcoming Conferences

The 1980 Conference of the Association of University Teachers of Accounting will be held at the University of Loughborough. The 1980 Conference of the European Accounting Association will be held at the Free University of Amsterdam.

The Third International Congress of Accounting Historians will be held at the London Business School on August 16, 17 and 18, 1980 during the centenary year of the Institute of Chartered Accountants in England and Wales. A special Accounting History issue of *Accounting and Business Research* will be published in 1980.

Cost Allocation and Resource Requirement Planning: an Alternative Approach

Dan S. Dhaliwal*

Reciprocal relationships among departments cause cost allocation and planning problems. These problems are normally solved by developing a system of linear equations to describe the physical system and then solving them by conventional algebraic techniques. The purpose of this paper is to present the applications of signal flow graph theory to the accounting problems of cost allocation and resource requirement planning. The application of 'Mason's Rule' to signal flow graphs provides a powerful means of solving cost allocation and input-output problems of moderate size without computers and also provides a clear picture of the physical structure of the problem at hand. Mason's Rule derives solution to these problems without having to develop a system of linear equations. The paper, however, also demonstrates how signal flow graphs can be used to develop systems of equations. Thus, if one is dealing with systems of large size, signal flow graph theory can be used as a means of generating the input to be fed into a computer for analysis. Specifically the paper discusses:

1. How to construct a signal flow graph to represent a given system of linear equations.
2. How the flow graphs can be drawn directly from the schematic diagrams of the physical structure of the system.
3. How the flow graphs can be used to derive the associated system of linear equations.
4. How Mason's Rule can be applied directly to the flow graphs to find the solution to the set of (unspecified) linear equations.

An overview of signal flow graph theory and Mason's Rule

One of the most important methods used in the modern analysis of linear networks and systems is the signal flow graph technique first introduced by Mason [4] in 1953. In essence, the signal flow graph technique is a graphical method of solving linear algebraic equations; it can be regarded as a counterpart of the matrix representation and solution. For instance, the following set of linear simultaneous equations,

$$\sum_{k=1}^{n} a_{kj}X_k = b_j \quad \text{for} \quad j = 1, 2, \ldots, n \tag{1}$$

can be represented by a matrix equation of the form

$$Ax = b \tag{2}$$

Usually, whether the above equation is in the algebraic form or in its matrix form, it can be conveniently solved by means of a digital computer. It is difficult, however, to visualise the relationships and interactions between signals and variables inside a system from a matrix equation. A signal flow graph, however, as the name implies, is used to portray the physical layout of a system. It is devised to describe the flow of signals from one point of a system to another and to examine the cause-and-effect relationships between variables.

Consider the linear equation:

$$X_j = T_{ij}\, X_i + T_{kj}\, X_k \tag{3}$$

where T_{ij} and T_{kj} are constants and X_i, X_j and X_k are variables.

This equation can be represented by signal flow graphs as shown in Figure 1. This flow graph

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* I would like to acknowledge the helpful comments of Gerald L. Salamon and William R. Kinney, Jr. and an anonymous referee of this journal.

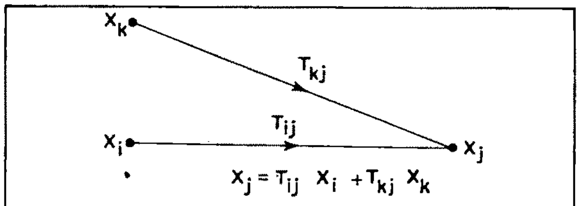

Figure 1

is described by its three nodes X_i, X_j, X_k and two branches T_{ij}, T_{kj}. A node of the graph represents the value of the signal variable at that point; T_{ij} denotes the transmittance from node i to node j and T_{kj} denotes the transmittance from node k to node j. In other words, Figure 1 states that as a signal travels from node X_i to node X_j it is multiplied by T_{ij}.

The value of the signal at any node is equal to the sum of signals at that node due to all incoming branches. For example, consider the node X_j in Figure 1. There are two incoming branches at node X_j: (1) coming from node X_i; and (2) coming from node X_k. Therefore, the node variable X_j is given by the sum of signals incoming from these two nodes, i.e., the value of the signal at node X_j is the equation (3) originally specified. Two important characteristics of flow graphs are that the value of the signal variable represented by a node is transmitted to all branches directed away from that node and that signals can travel along branches only in the direction of arrows.

The basic principles just described allow us to demonstrate how a system of linear equations can be represented by a signal flow graph. Consider a linear system which can be described by:

$$
\begin{aligned}
X_2 &= aX_1 \\
X_3 &= bX_2 + kX_4 \\
X_4 &= eX_2 + jX_3 + hX_4 \Rightarrow X_4 \\
&= \frac{1}{1-h}(eX_2 + jX_3) \\
X_5 &= cX_3 + gX_4 \\
X_6 &= dX_5 \qquad (4)
\end{aligned}
$$

These equations may be represented graphically as shown in Figure 2. Each variable is represented by a node. Thus, the left hand side of an equation is represented by a node. Branches are drawn from all nodes representing the variables on the right hand side of the equation to the node representing the left hand variable. The transmittance to the left hand variable node from a node representing a variable on the right hand side of the equation is equal to the coefficient of that variable.

It should be noted that the above set of equations can be rearranged in forms different than the equation set (4). Therefore system (4) can also be represented by flow graphs other than the one presented in Figure 2.

Signal flow graphs can be analysed either by using a step-by-step graph-reduction method or directly by inspection using Mason's Rule. The latter is usually preferred because of the ease with which it can be used. In addition, the chances of making an error in using the step-by-step reduction method become much higher as the complexity of the flow graphs increases. For these reasons only Mason's Rule will be discussed in this paper. For a discussion of the step-by-step reduction method one can consult one of several books on circuits and systems such as Lathi [3].

Mason's Rule

This rule was developed by Mason [4]. A few terms need to be defined before Mason's Rule can be clearly explained.

A *source node* or an *independent node* is a node having only outgoing branches and must represent an independent variable. X_1 in Figure 2 is an example of a source node.

A *sink* is a node with only incoming branches, e.g., X_6 in Figure 2.

A *dependent node* is any node which is not an independent node. Thus, the nodes X_2, X_3, X_4, X_5 and X_6 in Figure 2 are dependent nodes.

A *path* is a set of successive branches that can be transversed in the direction of the branches. For example: X_1–X_2–X_3–X_5–X_6 and X_2–X_3–X_5–X_2 in Figure 2 are two paths.

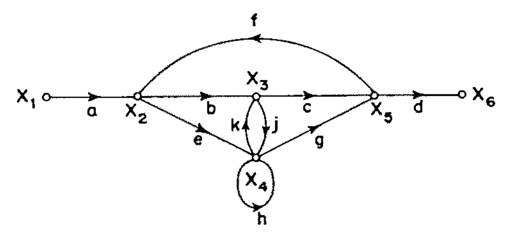

Figure 2

An *open path* is a path in which no node is crossed twice. X_1–X_2–X_3–X_5–X_6 in Figure 2 is an example of an open path.

A *loop* is a path that starts and terminates at the same node and does not cross any node more than once. Examples are X_2–X_3–X_5–X_2 and

X_3–X_4–X_3 in Figure 2. Loops are said to be *touching loops* if they have at least one common node; otherwise they are *nontouching*. Thus, in Figure 2, loops X_4–X_3–X_4 and X_2–X_3–X_5–X_2 are touching loops because they have node X_3 in common. On the other hand, the only loops which do not have any common node are X_4–X_4 and X_2–X_3–X_5–X_2. Therefore, X_4–X_4 and X_2–X_3–X_5–X_2 are the only non-touching loops in Figure 2.

The *transmittance* of an open path or a loop is the product of the transmittance of the branches of the path. For example, in Figure 2 the transmittance of path X_1–X_2–X_3–X_5–X_6 is given by

$$T_{16} = T_{12}\,T_{23}\,T_{35}\,T_{56} = abcd \tag{6}$$

Using the above definitions, Mason's Rule can be stated as:

$$X_j = X_s\frac{\Sigma T_k\Delta_k}{\Delta} \tag{7}$$

where

X_s is the source and X_j is the desired variable

T_k = the transmittance of the kth open path between X_s and X_j

Δ = 1 − (Sum of all individual loop transmittances)
+ (Sum of the products of loop transmittances of all possible nontouching loops taken two at a time)
− (Sum of the products of loop transmittances of all possible nontouching loops taken three at a time)
+ . . .

Δ_k = value of Δ for that part of the graph not touching the kth path.

To illustrate the application of Mason's Rule, consider the flow graph shown in Figure 2. Suppose that we want to express X_6 as a function of the source node variable X_1. This can be accomplished as follows. There are four open paths between X_1 and X_6. These paths and the corresponding transmittances are:

(1) X_1–X_2–X_3–X_5–X_6	$T_1 = abcd$
(2) X_1–X_2–X_4–X_5–X_6	$T_2 = aegd$
(3) X_1–X_2–X_4–X_3–X_5–X_6	$T_3 = aekcd$
(4) X_1–X_2–X_3–X_4–X_5–X_6	$T_4 = abjgd$

There are six loops: (X_2–X_3–X_5–X_2), (X_2–X_4–X_5–X_2), (X_2–X_3–X_4–X_5–X_2), (X_2–X_4–X_3–X_5–X_2), (X_3–X_4–X_3), and (X_4–X_4). However, there are only two nontouching loops: (X_2–X_3–X_5–X_2) and (X_4–X_4). Therefore

$$\Delta = 1 - (bcf + egf + bjgf + ekcf + kj + h) + bcfh$$

Parts of the graph which do not touch open paths 1 and 2 are shown below in Figures 3a and 3b.

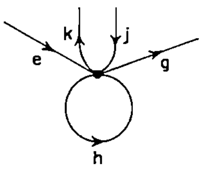

Figure 3a

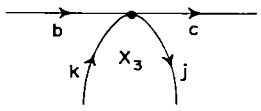

Figure 3b

There is no part of the signal flow graph that does not touch path 3 and 4. It can be seen that

$$\Delta_1 = 1 - h \quad\text{and}\quad \Delta_2 = \Delta_3 = \Delta_4 = 1.$$

Now we have all the information needed to express X_6 as a function of X_1 using Mason's Rule. That is:

$$\therefore\ X_6 = X_1\left(\frac{\Sigma T_k\Delta_k}{\Delta}\right)$$

$$= X_1\left(\frac{abcd(1-h) + aegd + aekcd + abjgd}{1-(bcf + egf + bjgf + ekcf + kj + h) + bcfh}\right)$$

Having explained Mason's Rule in general, we now turn to illustrate the application of this procedure to a cost allocation problem and a resource requirement planning situation.

Reciprocal cost allocation using signal flow graphs

To illustrate the application of signal flow graphs to problems involving reciprocal cost allocation, we consider the example presented in Horngren [1]. This problem involves two service departments (Repair and Power) and two production departments (Machinery and Assembly). The cost allocation within these departments can be represented as follows:

Cost of	Allocated to			
	Repair	Power	Machinery	Assembly
Repair		20%	60%	20%
Power	40%		20%	40%

The direct costs of the Repair and Power departments are \$30,000 and \$10,000 respectively.

Horngren presents the step method and the algebraic method of allocating the cost of service departments to the production departments. He points out that the essence of the linear algebra method, in this case, is to develop two simultaneous equations which are solved to find the values for the total costs of the service departments. These costs are then allocated to the production departments in the above percentages.

To solve this problem using signal flow graph theory, we shall first depict the above cost allocation scheme by a picture using flow graphs. This is done in Figure 4. In Figure 4, the node S is an artificial source node needed to start the 'flow' in the flow graph.

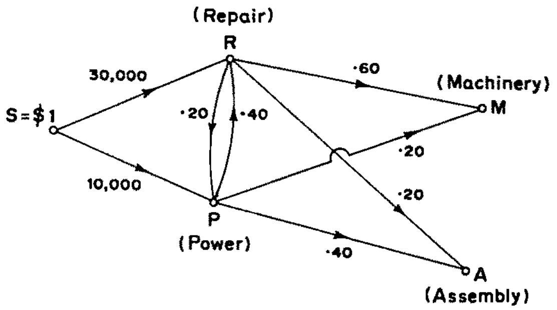

Figure 4

In Figure 4, arrows pointing towards a department indicate the costs being allocated to that department and the arrows pointing away from it indicate the departments to which its costs are being allocated. For example, when one considers the repair department in the diagram, arrows pointing towards it indicate that this department incurs $30,000 in direct costs and that 40% of department P's cost is allocated to R. Similarly the arrows pointing away from R tell the reader that 20, 60 and 20% of R's costs are allocated to departments P, M and A respectively.

Figure 4 can be used to develop the simultaneous equations used by Horngren. Using his notation, R = total cost of the repair department and P = total cost of the power department. Consider the repair department. As indicated by the arrows pointing toward R, there are two cost signals coming to R, one from node S and the other from node P. The value of cost at S is $1 and its transmittance to R is $30,000. Therefore, the value of the cost signal arriving at R from S is $30,000 ($1) = $30,000. Similarly the value of the cost signal at P is unknown and its transmittance to R is 0.4. Thus the value of the cost signal emanating from P and going to R is 0.4 P. Therefore, the total cost of the repair department is

$$R = \$30{,}000 + 0.4\,P \tag{8}$$

Similarly,

$$P = \$10{,}000 + 0.2\,R$$

These are the same equations that Horngren solves to find the total cost of each service department before that cost is allocated to the production departments. Thus, in addition to providing a picture of the allocation scheme within the departments, the signal flow graph can be helpful in developing the simultaneous equations which describe the problem. In general the procedure to develop simultaneous equations from signal flow diagrams is given by the following:

$$X_j = \Sigma X_i T_{ij} \tag{9}$$

i.e., the value of a variable at node j is equal to the sum of the values of the variables at all nodes transmitting a signal to node j, multiplied by the corresponding transmittance. Describing each of the node variables, except for the independent node variable, by (9) will result in a system of linear equations which describes the physical system under consideration.

The system of equations (8) developed above can be solved using either the algebraic notation or the matrix notation to determine the total cost of each service department. These costs of the service departments can then be allocated to the production departments. However, Mason's Rule could be used in this problem and would enable one to allocate the service department's costs to the production departments without having to develop and solve the simultaneous equations. Furthermore, the use of Mason's Rule eliminates the need for the intermediate calculation of the total cost of each service department to account for the reciprocal relations. We illustrate these points by using Mason's Rule in the above example. First, in order to find the amount of cost allocated to the machinery production department, we have to identify all the open paths from the source node S to node M (M represents the total cost allocated to the machinery department). These paths along with corresponding transmittances (T_k) and Δ_ks are given below.

Path	Transmittance	Δ_k
S–R–M	30,000 (0.6) = 18,000	1
S–R–P–M	30,000 (0.2) (0.2) = 1,200	1
S–P–M	10,000 (0.4) = 4,000	1
S–P–R–M	10,000 (0.4) (0.6) = 2,400	1

Note that each of the Δ_ks is equal to 1. This is so because there is no non-touching loop to any of the open paths. Furthermore, there is only one loop, R–P–R, in the entire diagram. Therefore

$$\Delta = 1 - (0.4(0.2) = 0.92$$

Now using Mason's Rule

$$M = S\frac{\Sigma T_k \Delta_k}{\Delta}$$

i.e.,

$$M = \frac{\text{S}[18{,}000(1)+1{,}200(1)+4{,}000(1)+2{,}400(1)]}{0.92}$$

$$= \$1[23{,}600/0{\cdot}92]$$

$$= \$25{,}652$$

Thus, the total service departments' cost allocated to the machinery production department is \$25,652 which is the same amount as found by Horngren using the linear algebraic method.

Resource requirement planning

The objective of this section is to illustrate how the signal flow graph technique can be used to determine the quantities of various input resources required to meet a given level of demand for various outputs. Consider a situation where departments X_1 and X_2 produce products X_1 and X_2 respectively.[1] Ten per cent of department X_1's production and 20% of department X_2's production is defective and has no salvage value. Each unit of X_2 requires 2.75 units of X_1 and each unit of X_1 requires 0.08 units of X_2. Each unit of X_1 requires three units of input resource R_1 and four units of input resource R_2. Similarly each unit of X_2 requires two units of R_1 and five units of R_2. The problem that management faces is this: How many units of R_1 and R_2 are needed to meet an external demand for one unit of X_1 (or X_2)?

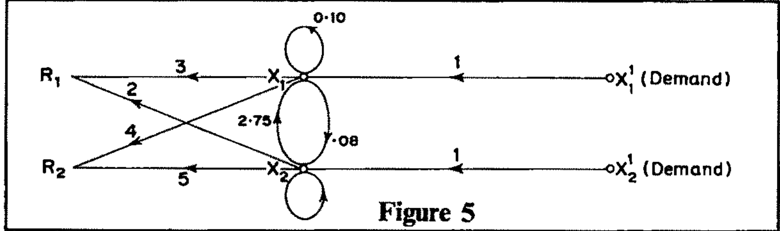

Figure 5

The above situation can be represented by the signal flow graph shown in Figure 5. X_1^1 and X_2^1 in Figure 5 denote the external demand for X_1 and X_2 respectively whereas X_1 and X_2 are the units that must be started in production to meet the external demand. It should be noted that X_1 has to be greater than X_1^1 because a portion of X_1 will be defective and another portion will be consumed internally for production of X_2. Similarly X_2 has to be greater than X_2^1.

The quantity of R_1 and R_2 required to produce a unit of X_1^1 or X_2^1 for external sale can be determined by application of Mason's Rule to Figure 5. Suppose that we want to produce one unit of X_1^1. There are two open paths between X_1^1 and R_1. These paths and the corresponding transmittances, T_k and Δ_k, are given below.

Path	T_k	Δ_k
$X_1^1 X_1 R_1$	$1 \times 3 = 3$	$1 - 0.2 = 0.8$
$X_1^1 X_1 X_2 R_1$	$1 \times 0.08 \times 2 = 0.16$	1

$$\Delta = 1 - (0.1 - 0.2 - 2.75 \times 0.08) + (0.10)(0.02) = 0.5$$

Therefore, by Mason's Rule

$$R_1 = X_1^1\left[\frac{3 \times 0.8 + 0.16X1}{0.5}\right] = 5.12$$

Thus 5.12 units of resource R_1 are required to produce 1 unit of X_1^1 for sale. Similarly it can be shown that one unit of X_1^1 will require 7.2 units of R_2. The reader can verify that one unit of X_2^1 will require 20.10 units of R_1 and 31 units of R_2. These results are consistent with those of Ijiri. For example, he finds that to produce one unit of X_1^1 for external sale, we must start 1.6 units of X_1 and 0.16 units of X_2.[2] Obviously, this will require $1.6 \times 3 + 0.16 \times 2 = 5.12$ units of R_1 and $1.6 \times 4 + 0.16 \times 5 = 7.2$ units of R_2.

The above example has demonstrated two points. First, a fairly complex situation involving reciprocal production departments can be visualised easily by depicting it in the form of a signal flow graph. Second, the production manager can determine his input resource requirements to meet a given level of external demand for various products by applying Mason's Rule to the signal flow graph. Therefore, the signal flow graph technique is a useful budget technique for determining basic resource requirements and thus provides information which is necessary to the determination of a comprehensive profit plan for the firm.

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[1] Taken from Ijiri [2].

[2] It should be noted that these results can be obtained quickly by applying Mason's Rule to Figure 5. However, this intermediate step is omitted in this example because we are interested in determining R_1 and R_2 and these quantities can be determined directly by Mason's Rule.

Summary

This paper has shown how signal flow graph theory can be used to solve some important cost accounting problems. This approach is suitable when one is dealing with problems of moderate size and the technique provides one with a clear picture of the physical system under study. For problems of large size which will be solved by computers, signal flow graphs aid one in specifying the system of equations in the manner required by the computer software package.

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Book Reviews

Readings in Accounting and Business Research 1970–77. *Edited by R. H. Parker.* Institute of Chartered Accountants in England and Wales, 1978. 184 pp. £5 ($12).

The first issue of *Accounting and Business Research* appeared in the Winter of 1970, under the sponsorship of the Institute of Chartered Accountants in England and Wales. At the time, it was the only British academic journal devoted mainly to accounting (having succeeded the defunct *Accounting Research*), and from its inception it has been the main outlet for papers by British academics in accounting, although it has also attracted some outstanding contributors from abroad, as is testified by the contributions of Chambers, Gynther, and Sterling to the present volume. Despite sponsorship by the profession and an editorial policy which has always laid great stress on clarity and simplicity of exposition, the journal has failed to attract many contributions from practitioners, and this probably reflects the readership pattern. This is the only serious flaw in an otherwise successful record, and is bemoaned by Professor Parker in his Preface. One suspects that the 'schism' between academics and practitioners which is currently being discussed so earnestly in the USA will never arise in the UK because the UK profession is unaware that the academic world exists!

Professor Parker, the editor of *Accounting and Business Research* since 1975, has selected 16 articles, by 22 authors, from the first 7 years. There are six articles on income measurement and asset valuation and two on each of the following topics: objectives and functions of published accounting reports, budgets, divisional performance, auditing, and accounting history. The latter topic clearly reflects the editor's own scholarly proclivities, but otherwise he has adhered fairly closely to his avowed aim of collecting 'for the use mainly of teachers and students... articles of most lasting value and which enquiry has suggested are most frequently referred to. Many worthy articles have had perforce to be omitted.'

This leads us to the main potential criticism of the book: that instead of representing the best of *Accounting and Business Research*, i.e. what *ought* to be read, it represents what *is* read, particularly for undergraduate teaching purposes. The motive for doing this is clearly a practical one: to ensure sufficient sales to justify the venture in economic terms. However, from a purely academic standpoint, it is a pity that the editor has striven to lead and educate the audience only in the field of accounting history, in which the two selected papers are of distinctly above-average quality, especially Williard Stone's excellent account of 'An Early English Cotton Mill Cost Accounting System'. Elsewhere, the preponderance of articles is of the survey or review type, with relatively little formal rigour or empirical evidence, and hardly any new contribution to knowledge (as opposed to felicitous exposition of old knowledge, which abounds). It is notable that 11 of the 16 articles date from the first half of the 7-year period. This probably reflects the time-lag between the publication of an article and its adoption by teachers and possibly also testifies to the changing character of *Accounting and Business Research* over the period: early issues contained many well-written 'state of the art' essays, some of which are reproduced in the present volume, whereas more recent issues have contained more papers reporting new research, which tend to be more tightly argued, narrower in scope, more difficult to read, and therefore less suitable for student consumption.

In order to support the assertions of the previous paragraph without resorting to the invidious process of picking out individual papers, the reviewer searched the book for some conventional signs of rigour (or what its chief exemplar, *The Journal of Accounting Research*, would describe, with unintentional ambiguity, as 'rigor'). Such basic mathematical operations as matrix inversion or differentiation seemed to be totally absent from the text (although implicit in some of the arguments). Basic statistical techniques, such as analysis of variance, regression analysis and even simple significance tests, were also virtually absent (although analysis of variance and confidence intervals do appear on pages 117–20). Furthermore, that more traditional sign of rigour in accounting, the use of debit and credit notation, is decidedly thin on the ground and does not make its first appearance until page 75, where Professor Gynther treats the reader to two journal entries.

It would be wrong to blame the editor for this state of affairs, for two reasons. Firstly, he has chosen to aim at an audience which has specific needs, and these needs are not those of the reviewer, so that the issue is partly one of personal preference. Within his chosen constraints, the editor has done a good job. Secondly, the contents of *Accounting and Business Research* impose a major constraint on choice, partly because the journal has always striven to be comprehensible to a wide audience and partly because the style of academic accounting in Britain leans more towards the literary and the discursive than towards the rigorous and formal style which is favoured in North America. The British style has much to commend it: it certainly gives rise to a more readable product than is typically found in the two leading US journals. However, it would be complacent to deny that it also permits faults, particularly indulgence in loose *a priori* reasoning, and a tendency to appeal to the authority of previous writers or casual observation rather than to systematic empirical evidence.

Although it is important to avoid complacency, it would be both churlish and, more importantly, grossly inaccurate, to end this review on a pessimistic note. With regard to the volume under review, this will clearly be of great value to teachers and students: it may not contain all the best papers published in the journal, but it certainly contains the most widely read and some of the best for teaching purposes, and it therefore fulfils its avowed purpose. Moreover, some of the papers will be of lasting importance, e.g. Gynther's 'Why Use General Purchasing Power?', which is an admirably clear distillation of the work of one of the most trenchant pioneers of replacement cost accounting. Finally, with regard to *Accounting and Business Research*, the creation of a flourishing journal is bound to be a cause for congratulation to the two editors who have guided it through its formative years. Not everything in the garden is lovely, but the ground was completely barren nine years ago, and the crop is improving every year. We can look forward with some optimism to the collection of readings covering the next seven years.

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The Value Added Statement. *Michael F. Morley.* Gee and Co. for Institute of Chartered Accountants of Scotland, 1978. x + 150 pp. £3.95.

The value added statement has proved to be much the most popular of the remedies prescribed by *The Corporate Report.* Professor Morley's work continues in the spirit of *The Corporate Report*: it is concerned with general reporting; its approach 'is practical and accounting theory [is] used not for its own sake but as a tool to forge solutions to guide accounting practice.' (p. 1). Professor Morley describes his objectives in writing his book as being to provide an introduction to value added statements for accountants and students, to provide practical guidance on the preparation of such statements, and to contribute to the development of a standard on the subject. The report falls into three main parts: a discussion of the meaning and usefulness of value added statements; an extended analysis of the many technical problems which arise in their production; and a brief discussion of the interpretation of value added by ratio analysis.

A clear, logical and systematic model of value added is vital if the value added statement is not to be quickly discredited. The concept has enjoyed a wide popularity in the last few years; it has been advocated for a variety of uses, including not only general reporting but also, *inter alia*, the design of payment systems, wage control and the management of industrial democracy. This suggests that value added is either a very powerful tool or a very blunt one. Already some parties are coming to view value added with suspicion, and unless accountants can offer a coherent response to their criticisms, the profession may lose the chance to assist (and profit from) a wider audience for financial information.

Professor Morley's acceptance of the general and comprehensive framework of financial reporting employed in *The Corporate Report* restricts the force of his analysis. In particular, he follows established practice in attempting to combine a variety of concepts of value added, ranging from the net contribution to social wealth to the fund available for distribution amongst some defined group. Under sufficiently restrictive assumptions these views will amount to the same thing, but in the real world in which statements have to be drawn up there are wide differences. Professor Morley adopts a definition in terms of wealth creation, but the fund approach is apparent at many places in his book, including, for example, the suggestion in respect of property companies that 'if the Articles of Association of the Company require that any profits on sales or property be placed to a capital reserve then it would clearly be misleading to show such profits as part of Value Added, for they are not distributable.' (p. 129).

Much of the attractiveness of value added derives from a politically and economically naive view of industrial activity, which can perhaps be described as the 'let's bake a cake' philosophy. This is characterised by an emphasis on labour and capital as a 'team' rather than an uneasy coalition, and by the separation of the creation of wealth from its distribution. Many of the problems which face accountants trying to draw up value added statements arise because reality is far more complex.

Within the limits imposed by the general framework, Professor Morley makes a number of very useful proposals for changing and extending the model suggested by *The Corporate Report*. He argues strongly and persuasively in favour of treating depreciation as an input cost. There seems to be no reason to continue the popular practice of calculating gross value added and listing depreciation as an allocation: economists may prefer gross income because they do not trust depreciation calculations, but if accountants are prepared to incorporate depreciation in the main accounts they should be prepared to recognise the using up of fixed assets as a cost of creating wealth.

The value added statement shows not only what wealth has been created by the enterprise but also how wealth has been distributed. However, wealth which has already been created may come into the hands of the enterprise (for example as investment income) and be available for distribution, and this upsets the simple model of value added. Professor Morley suggests that such wealth should be distinguished from the value added by the enterprise itself. He also has useful suggestions to make about the treatment of rent, minority interests and retentions. No measure of value *added* can be better than the underlying measure of value, and Professor Morley includes a discussion of the use of current values in value added statements. There seems to be no reputable way of avoiding the use of current values in this context, although, of course, to admit current values to the statement of value added is to add to whatever problems already exist all the existing controversies of current value accounting, and probably some new ones besides. It is not clear, for example, whether the gearing gain on trade credit is to be treated as a reduction in the effective cost of inputs or a reallocation of wealth between shareholders and suppliers *qua* lenders.

The interpretation of value added statements requires extreme care; in particular the proportion of value added which goes to labour is bound to be a sensitive issue. Professor Morley explains that comparisons between different industries will be affected by different degrees of labour intensiveness. However this consideration will also affect comparisons within the same industry and through time. He discusses schemes to allocate a constant proportion of value added (or of increases therein) to labour without fully considering the consequences of these problems. If an increase in value added is brought about entirely by the increased efforts of the labour force there seems to be no reason why the increase should not be used to pay higher wages. By the same token the automatic allocation of a proportion of additional value added to labour may discourage capital investment, if this cannot be paid for out of the balance of value added.

Current practice in reporting value added is haphazard and inconsistent. I am sure that Professor Morley's study will make a valuable contribution towards the standardisation of practice. He argues that to focus attention on value added may bring about useful changes in attitudes within industry. It seems likely however that if the attempt to capture a highly complex reality within the simple framework of value added fails, there will be harmful consequences, both for the users of financial reports and for the accountants who prepare them.

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The British Tax System. *J. A. Kay and M. A. King*. Oxford University Press, 1978. 263 pp. £2.95.

The Economics of Taxation. *S. James and C. Nobes*. Philip Allan, 1978. 302 pp. plus workbook 58 pp. £5.

The Economics of Taxation (EoT) is written specifically for the student market with the avowed intent of providing an introduction to the economic theory of taxation together with an account and discussion of the UK tax system. As such it is regarded as being suitable for students of accounting, economics, law, politics and social administration, all of whom are expected to have a first year undergraduate background in economics. *The British Tax System* (BTS) does not assume any such background and is aimed not only at the student but at anyone interested not only in the structure of the present tax system but in its reform. The emphasis is on the structure of the system as a whole rather than on the detail of its implementation.

Without wishing to be unfair to the latter work or to underrate its proposed reforms, both books will here be reviewed in terms of their suitability as texts for university or equivalent courses in taxation, although their role as texts will clearly depend on whether the course in question is part of an economics, accounting or law degree. By adopting this approach little attention will be given to the merits or otherwise of the reforms outlined in BTS. Suffice it to say that both authors were members of the Meade Committee: they acknowledge their debt to that Committee and recognise the impact that it had on their thinking. Their proposals do indeed move in the same direction as the Committee's, opting for a move towards an expenditure tax; but they seek to spread the tax net wider by treating the making of gifts as an act of consumption and as such taxable under an expenditure tax.

Structurally the two books are very different: EoT devotes five chapters (117 pages) to the economic principles of taxation, and then in Part 2 (175 pages) moves to 'a description of present taxes, analysis of their strengths and weaknesses and discussion of alternatives and possible reforms'. By contrast BTS presents what the authors consider to be the relevant economic principles in a crash course of 13 pages and in its remaining 231 pages examines the problems facing the British tax system in light of the economic analysis previously outlined. The authors of BTS see the central economic issues as being incidence and neutrality, the latter covering the effect of taxation on both welfare and incentives. They devote considerable attention (relatively) to tax capitalisation, the process whereby the introduction or withdrawal of taxation is reflected in the fall or rise respectively in the capital value of an asset so that the rate of return is thereafter not affected, without perhaps emphasising explicitly enough (although it is implicit in their examples) that capitalisation must be a function of a selective as opposed to a general tax and as such an aspect of neutrality. Omitted are the questions of equity and economic stabilisation, the latter quite deliberately so on the grounds that the choice of tax *structure* has little relevance to it. Both issues are covered in EoT, together with the questions of efficiency and incentives, at the level which one would expect of a public finance text. For the student from a discipline other than economics there is a real value in this approach if he is to understand the economist's analysis of taxation in any real depth, although he will need to have some familiarity with the methodology. One important omission is discussion of a lifetime as opposed to an annual tax base (except a mention in respect of a sales tax). It is only by ignoring the question of utility over lifetime that it can be argued (page 78) that the claim that there is a double taxation of savings under an income tax is insubstantial and rests only on a prior decision to use expenditure rather than income as an index of ability-to-pay. This type of argument would be better employed in suggesting that the taxation of inflationary gains is only inequitable if real rather than money income is the chosen tax base.

In Part 2 on policy and practice, EoT has two chapters on the taxation of incomes (including social security), one each on capital and indirect taxation, and a further two on corporate taxes. Given the space available it is questionable whether one quarter of the material on taxes on income should be devoted to the administrative issues of PAYE and self-assessment. This is not to deny their importance but rather to question the balance. Similarly to devote the last chapter to the international aspects of corporate taxation seems out of place given the preceding discussion: international comparisons of corporate tax systems are a useful vehicle for analysing possible systems as a whole, but questions of branches and subsidiaries, overspill relief, withholding taxes and detailed differences in methods of computation seem ill-chosen in the context of this book. The 10 pages of appendices on corporation tax, capital allowances, loss relief etc. would be better placed in the work-book, or, if really relevant to the exposition, integrated into the text. In fact the chapters on corporation tax are probably the least satisfactory. For example, the treatment of the imputation system (page 255) is of doubtful validity: the excess liability of a higher-rate taxpayer on his dividend income is expressed as a percentage of his cash dividend so that the 98% payer is shown to suffer an effective rate of 97% and the basic-rate payer one of 0%. Had it been pointed out that on this basis the nil rate tax payer would have an effective rate of −51.1%

then the irrelevance of this approach would be clear.

There are other instances which raise questions as to the exposition in Part 2: the capital gains tax is said to discourage investment in non-productive goods (page 150) when in fact the favourable rate, combined with no tax on imputed income, surely has the opposite effect. Similarly revenue from excise duties is said to have risen faster than inflation in spite of increases in the rates of duty, from which it is concluded that demand is inelastic. Yet it is surely well known that these unit based taxes have in real terms benefited from a reduction in real rates of taxation and that such increases in money rates as there have been have usually been introduced in a deliberate attempt to maintain the real rate.

Probably these deficiencies arise essentially from the limitations of space. Their chosen structure forces the authors to compress too much into too few pages. In part, as already indicated, this is because they dwell too long upon certain topics, and include others better omitted. On the other hand a real attempt has been made to relegate certain detailed information to a supplementary workbook which is to be re-issued each year. This is a useful way of expanding issues which are of general importance in the context of overall exposition and analysis, but which are complicated enough in practice to require further explanation. It will also no doubt provide a useful vehicle for cross referencing significant changes in the tax structure to the main text. The inclusion of essay and numerical questions is perhaps less useful.

A more fundamental weakness is, with the benefit of hindsight, the division of the book into two parts. There is no need to separate principles from policy and practice; indeed to integrate them can add clarity to both, and avoids needless repetition and cross referencing. Instead we find relatively important issues referred to and not discussed, or slipped in as asides in contexts which do not perhaps allow us to see their full impact. Thus we find the effect of personal allowances in generating a progressive structure is given five lines hidden away in a discussion of National Insurance Contributions while the intricacies of the age allowance and the soon to be forgotten child allowance are expounded during the four pages devoted to allowances. The result is that Part 2 is in parts lightweight and superficial. This is a pity because the authors are clearly seeking to raise the standard of the academic study of taxation above the rather humdrum computational or legalistic approach typical of a professional course, and there are enough glimpses of their true potential to see that, given a different structure, they would have been even more successful.

This weakness of EoT is the strength of BTS. The authors claim that much of what is wrong with the present system derives from the failure to recognise the principles that do or should underline it. Their approach is therefore to ask of each part of the tax system—'what are the underlying principles?', and in this they succeed admirably. By so doing they advance their cause for reforms, but, more important from our point of view, they provide an exposition and analysis of the present tax system which is unsurpassed and which every student of taxation should read. It has the added advantage of being written in an evocative style which even the unwilling student should find difficult to resist.

Income tax is covered over three chapters, one general (but containing an unusually valid international comparison of tax rates based on national average incomes) and one dealing with each of the taxation of earnings and savings. The first of these is concerned particularly with incentives and in this connection examines the extensive provision of fringe benefits in Britain. The second shows how tax privileges have had a dramatic effect on the structure and composition of personal wealth, tending to divert private funds either into non-productive assets or to institutional investors. Distributional considerations are covered in a chapter on social security where the problems of the lower end are fully discussed; indirect and local taxes are considered in the following two chapters, the latter giving a useful exposition of the rating system and its relevance to local government finance. The taxation of capital is followed by two chapters on company taxation—one on principles and one on the practice in the UK. Both chapters could have benefited from a few more simple but clearly presented numerical examples which would highlight the differences between the corporate tax systems and the effects on capital structures and distribution policies. These matters are of course covered but not as clearly as might be wished. There follows a particularly challenging chapter on the distribution of the tax burden which covers the problems of the tax unit, measuring the tax burden and defining equality, and a discussion of the most appropriate rate structure. Interspersed are two chapters on the tax base and an expenditure tax which are at the centre of the reform proposals, and there is a concluding chapter in which the possibility of widening the present income base and lowering the tax rates is discussed as an alternative to the reforms proposed. Throughout there is reference to empirical evidence and where appropriate the problems raised by inflation are discussed. There is one sensibly limited set of references and a collection of suggestions for further reading. The main omission is a breakdown of the UK tax revenue, for without it the reader can only take the authors' word for it that, for example, corporation tax raises relatively little revenue.

One of the attractions of taxation as an area of study is its immediacy, and just because of that one of its challenges is to require students to use the appropriate tools of analysis to dispel the numerous popular myths that drift in and out of fashion. BTS should encourage the student in this direction: we see that it is not so stupid after all to have a tax threshold below the poverty line (page 113); that the proper balance between direct and indirect taxation is one of the less important policy questions to be resolved (page 145); and that special tax concessions are not the best way to deal with the problems of small businesses. We are also reminded by EoT that the reduced rate band is not a distributional but an incentive requirement (page 177), but neither text satisfactorily questions whether families do in fact face the high marginal rates occasioned by the withdrawal of means tested benefits. Parliamentary questions elicit the information that large numbers of low income families (50,000 December 1975 and 20,000 December 1976) *theoretically* face marginal rates of over 100%; but not enough weight is given to the annual uprating of needs levels and the extended periods for which benefits are awarded. However, such is the spirit of inquiry engendered by BTS that its readers should be encouraged to question not only popular beliefs but also some of the authors' own conclusions and suggestions for reform. This book does not, nor does it set out to, cover the principles of public finance in sufficient depth for an academic course on taxation, but it should be required reading for any student seriously involved with taxation; and at the price it is a bargain which, given the pace of real tax reform, is likely to be of lasting value.

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An Audit Approach to Computers. *Brian Jenkins and Anthony Pinkney*, Institute of Chartered Accountants in England and Wales, 1978. xxii + 435 pp. £11.95

Brian Jenkins and Anthony Pinkney, partners in Coopers & Lybrand, have combined to produce a comprehensive revision of Pinkney's original publication under the same title. One is led to assume that the book now reveals the way in which Coopers & Lybrand approach an audit when computers are involved.

The book, as its sub-title 'A new practice manual' would suggest, has been written primarily for those practising accountants who are involved in expressing audit opinions on the financial statements of those companies that process and store their accounting data by means of a computer. The number of audits of this nature has increased substantially over the past few years. The rate of increase of computer audits is bound to accelerate as more and more companies, encouraged by the reduced costs of computer hardware and the increased ease of use of computer software, transfer their accounting routines to a computer.

Internal audit departments are also likely to find the book of interest as the authors have included chapters and sections which deal with computer security and efficiency. The chapters regarding systems and controls will also be of interest to management, especially in situations where computers are being installed for accounting applications for the first time.

The authors start off by emphasising that the audit approach in a computer system is similar to that in a non-computer system, so that the first task is to understand and record the procedures and controls within the computer system. The authors emphasise that to do this the auditor will need to have a basic understanding of the principles of computers and computer processing. They assume that their readers will have an understanding. However, they provide a helpful appendix which sets out typical examples of computer systems for sales and purchases accounting, inventory control, payroll and fixed assets.

The authors then move on to the evaluation of controls, and they cover, in detail, the evaluation of user controls, 'programmed procedures' controls, and integrity controls. To reinforce this, they include, as an appendix, questions which might be included in a suggested internal control questionnaire (ICQ) which integrates the review of both the computer and the non-computer systems. The questions cover some 60 pages in the book, but the authors suggest that, although they are representative, they do not comprise all the questions that are required in practice.

The suggested ICQs have the possible shortcoming that because the EDP and the non-EDP questions are combined, the resulting evaluation may be difficult to follow. In addition, no guidance is given on evaluating whether or not a control objective is met. As a result, it could be very difficult to perform a proper evaluation and subsequent review on the basis of the information given in the book.

The chapters dealing with integrity controls give consideration to the detailed control requirements and techniques that may be relevant to the auditor. The description of those controls is interesting and informative, but no guidance is given as to when they might be of relevance.

The description of the individual areas of processing controls (such as program libraries and data base administration) are somewhat superficial, and gloss over their technical complexity. The probable inability of the non-specialist accountant to effectively evaluate these controls is not explained, and the potential dangers are not stressed.

As in non-computer systems, there is, of course, a need to verify whether the internal control procedure identified in the ICQ is functioning. That, and the need to carry out substantive tests, leads the authors into discussing the use of computer programs to meet these objectives. They recommend the use of such programs, and they state that, depending on the nature of the program, it should be possible to obtain a statistical, systematic, or random sample.

The reviewer read the section on the extent of validation procedures with interest, and in the hope that guidance would be given as to how many items should be selected for testing. He was left with having to make a decision from the degree of reliance on internal control; the materiality of the items in relation to the accounts; the nature, the number and the size of items that comprise the particular account balance; the extent to which the account balance can be correlated with other accounts and information; and the extent to which exceptions are identified whilst applying the validation procedures.

The authors say that there are two general factors related to control which will often justify reducing the level of substantive testing for computer-based accounting systems, compared with the level required with manual systems. These factors are:

(a) Improved account analyses produced by the computer.

(b) Improved internal control over the up-dating and maintenance of details of account balances and standing data.

No guidance is given as to the extent of the reduction in the level of testing.

The authors state that when the auditor cannot, or prefers not to, rely on internal control for the purpose of limiting his validation procedures, it will be necessary for him either to go into more depth or to select more items for testing. Once again they give no guidance as to the extent of the increase in the level of testing.

The last chapter of the book sets out in a most helpful manner a suggested way of organising computer auditing within a practising firm or within an internal audit department. Here the authors identify the need to develop computer audit specialists to undertake the more complex computer work that general audit staff who have lower levels of computer audit skills are not equipped to tackle. They say that there is an increasing opportunity for using technical (presumably, non-accountant) staff as computer audit specialists, but surprisingly they do not actually recommend this path of action. The chapter then sets out suggestions on the level and extent of training that those persons who are involved in computer audit work require.

The authors conclude the book by rightly emphasising that developments in the computer audit field must take place within an overall audit framework that seeks to integrate the manual and the computer elements of the audit.

This book is a valuable addition to the computer audit field, and it will be a useful input for the market at which it is aimed. Purchasers should, however, be aware that a lot more knowledge and information is required in order to properly understand and record computer systems effectively. The book is not, as its sub-title suggests, a fully comprehensive practice manual. To this end, recommendations of further reading material would have been helpful.

London Ian Marrian

S. T. Horngren's **Introduction to Management Accounting** (Prentice-Hall, 4th ed. 1978) reviewed by *R. E. V. Groves* in the Autumn 1978 issue is now available in the UK in paperback at a price of £6.50.

Contributors to Accounting and Business Research Volume 9 No 34 Spring 1979

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Editorial

Academic accounting journals are much younger than accounting or the accountancy profession. In Britain the key dates are probably 1543 (Hugh Oldcastle's *A profitable treatyce*..., the first book in English on double entry), 1854 (the first chartered accountants—in Scotland), 1874 (the first accounting journal—*The Accountant*), 1880 (establishment of the Institute of Chartered Accountants in England and Wales), 1948 (not only an important Companies Act but also *Accounting Research*, the first British academic accounting journal), 1958 (*Accounting Research* ceases publication) and 1970 (*Accounting and Business Research* established as successor to *Accounting Research*).

During the 1970s British academic accounting has flourished to an extent that none would once have thought possible. Academic accounting journals have also flourished despite the problems of rising costs. *Accounting and Business Research's* subscription list has never been longer and it has no problem in obtaining good articles for publication. The reverse is in fact now the case: the queue of accepted but as yet unpublished papers is becoming embarrassingly long. This certainly reflects the current strength of British academic accounting (although *Accounting and Business Research* also publishes many articles from North America and Australasia) but this is perhaps an insufficient consolation for expectant authors. The problem is not likely to go away but we shall do the best we can within the financial constraints. It is hoped that the occasional issue will be 96 rather than 80 pages long.

The more subscribers we have the weaker the financial constraints become. Anyone who thinks *Accounting and Business Research* is worth publishing in should also consider it worth buying. It is pleasant to report that the submission fee of £10 ($20) for non-subscribers in force since April 2, 1979 has persuaded almost every contributor to become a subscriber. Many, of course, already were.

1980 will see the centenary of the English Institute and the tenth anniversary of *Accounting and Business Research*. The collaboration of professional and academic accountant whilst late in starting should have many fruitful years to run.

Narrative Disclosures Contained in Financial Reports: Means of Communication or Manipulation?

Arthur Harris Adelberg

Introduction

For the efficient allocation of society's scarce resources to occur, publicly-held corporations must compete for capital (money) in a fair and equitable manner, based on the *communication* of information to investors and creditors adequate to enable informed appraisal of alternative investment and credit extension opportunities; and explicit and carefully designed statutory (i.e., Securities and Exchange Commission) and professional (i.e., Financial Accounting Standards Board) disclosure requirements are necessary to ensure this. This overall objective of financial reporting is commonly called 'user-oriented reporting.' The Financial Accounting Standards Board's *Conceptual Framework for Financial Accounting and Reporting: Elements of Financial Statements and their Measurement* gives specific recognition to the importance of users of financial reports:

> Financial statements of business enterprises should provide information, within the limits of financial accounting, that is useful to present and potential investors and creditors in making rational investment and credit decisions (1976, p. 25).

Unfortunately, there is a wealth of empirical evidence supporting what Standish terms 'management-oriented reporting':

> Corporate reporting is a variable, to be adjusted or *manipulated* by management in support of its strategies and goals, subject to whatever statutory disclosure constraints exist. The operational objective in regard to reporting is, presumably, to influence or *manipulate* investor reactions, sustain a satisfactory share price and raise capital on the cheapest and most advantageous terms (1970, p. 4).

Dyckman (1964), Gordon, Horwitz, and Myers (1966), Boggs (1966), Archibald (1967), Summers (1968), Copeland (1968), Simpson (1969), Graber (1969), Cushing (1969), Mlynarczyk (1969), Ratliff (1970), Seglund (1971), and Comiskey (1971) have all demonstrated that management engages in various financial statement manipulations under the umbrella of generally accepted accounting principles to 'influence' users of financial reports.

Recently, a research study by Morton has added a new dimension to the manipulation problem in financial reporting. Morton sent a questionnaire to 128 security analysts, credit analysts, public accountants, and management and found a statistically significant positive correlation between perceived *understandability* of financial statement footnote disclosures and the extent to which the disclosures are perceived as having a positive (favourable) or negative (unfavourable) bearing on the investment or credit extension decision. He offered several possible interpretations for the empirical results obtained:

> First, unfavorable disclosures may be inherently more difficult to understand. For example, the issuing company may intentionally present unfavourable disclosures in a manner that is difficult to understand. Or, as disclosures become more unfavorable to the company, conflicts may arise between management and the auditor concerning their possible disclosure, resulting in vague and verbose disclosures which are difficult to understand. In contrast, unfavorable disclosures may be no more difficult to understand than favorable disclosures, but because the reader expects negative disclosures to present an incomplete or biased picture of the true situation, greater complexity and meaning may be attributed to such disclosures than is warranted (1974, pp. 195–196).

Morton admonished, however, that the major limitation of his study (which precluded even normative policy recommendations) was that his data were based on 'opinion of questionnaire respondents . . . rather than the intrinsic . . . understandability . . . of such disclosures' (p. 294). Consequently, '. . . the conclusions drawn herein are more in the nature of hypotheses for further research than conclusions per se' (p. 295).

As an extension of Morton's study, this paper reports the results of a behavioural field experiment conducted by the author. Its purpose was two-fold: in place of the *subjective perceptions* of questionnaire respondents, (1) to measure *objectively* the understandability of narrative disclosures contained in a sample of financial reports and (2) to correlate the results obtained with an *objective* measure of managerial performance (i.e., the absolute dollar change in earnings per share).

Design of the study

The Research Hypotheses

The following research hypotheses were tested:

I. Narrative disclosures are well understood by sophisticated users.

II. The level of understandability of the type of message varies directly with the change in earnings per share from 1974 to 1975 of the source corporations to a statistically significant degree.

The cloze readability procedure

There are several possible methodologies available to assess objectively the 'intrinsic understandability' of narrative disclosures. Conventional reading comprehension tests (true-false, multiple-choice, fill-in, etc.) that measure the interaction between the reader and the material were rejected as *measuring instruments* because they require an expertise in test construction not generally possessed by participants of the accounting communication process. General purpose readability formulae (Flesch Reading Ease Formula, Dale-Chall Formula, etc.) were also rejected as *predictive instruments* because they have (1) inherent limitations and (2) an inability to cope with technical communications (Adelberg, 1978). A thorough search of the literature revealed an acceptable alternative methodology, the Cloze Readability Procedure.

Theoretical Foundation

In 1953, Wilson Taylor introduced the Cloze Readability Procedure as a new tool for measuring readability. He defined cloze as 'a method of intercepting a message from a transmitter (writer or speaker), mutilating its language patterns by deleting parts, and so administering it to receivers (readers or listeners) that their attempts to make patterns whole again potentially yield a considerable number of cloze units' (p. 416). Thus, a 'cloze unit' came to be 'any single occurrence of a successful attempt to reproduce accurately a part deleted from a "message" (any language product), deciding from the context that remains, what the missing part should be' (Taylor, 1953, p. 416).

The idea of having the reader reconstruct a passage by filling in missing words was theoretically based on Gestalt Psychology. Taylor made the relationship between cloze and Gestalt Psychology clear by stating:

> Cloze procedure derives its name from 'closure' a term that expresses the gestalt-psychology notion that a person presented with a not-quite-finished circle, for example, tends to make a 'good figure' out of it by mentally closing up the gap. Although part of the figure is missing, he is said to perceive the almost-circle as a whole one, and thus assigns it to a form class with which he is already familiar. In a similar way, one listening to a broadcast on a static-filled evening might hear 'President Abraham _________ once told a story about a slave owner who . . . ' and almost instantaneously and quite unconsciously close the gap by filling in 'Lincoln' (1954, p. 21).

Wilson and Carroll discussed the underlying logic of the Cloze Readability Procedure vis-à-vis communication theory as follows:

> . . . If the encoder (financial report preparer) producing a message (narrative disclosure) and the decoder (financial report user) receiving it happen to have similar semantic and grammatical habit systems, the decoder ought to be able to predict or anticipate what the encoder will produce at each moment with considerable accuracy. In other words, if both members of the communication act share common associations and common constructive tendencies, they should be able to anticipate each others' verbalizations (1954, p. 49).

The Cloze Readability Procedure is, therefore, an *objective measure* of language correspondence between reader and writer.

Thus, if a reader of financial reports finds the statement, 'The use of _________ accounting is required in a business combination between unrelated parties affected by the exchange of common shares,' or 'The use of pooling-of-interests accounting is required in a business combination _________ unrelated parties affected by the exchange of common shares,' he could, in each case, form a structured whole by inserting a word which would make the statement meaningful.

It should be noted that the correct response in each of the previous two examples would indicate the respondent's grasp of a different aspect of meaning. In the first example, the ability to predict the word 'pooling-of-interests' depends *primarily* upon knowledge of generally accepted accounting principles and its specific name. The respondent must, of course, understand the word meanings and interrelationships involved in the context in order to understand what information is desired. In addition, however, he must possess specific information in order to respond correctly. A complete understanding of the form and content of the context would not be sufficient to provide clues for the correct response.

In the second example, the correct response 'between' would indicate *primarily* the understanding of an interrelationship between the words 'pooling-of-interests,' 'business combination,' and 'unrelated parties' as they are used in the context. In this case, an understanding of word meanings in the context is involved in the process of making the correct response. Unless the abstract pattern were grasped, however, the correct response could not be made even if the respondent understood each of the individual words.

These two components of meaning (lexical and structural) are closely related and are involved in all reading. Yet as demonstrated in the two examples, the Cloze Readability Procedure seems to allow the measurement of one or the other, depending upon the type of word selected for deletion. The selection of words to be deleted by either a random or 'every *n*th' method, the technique used in this research project, provides a basis for scoring cloze tests that would indicate comprehension of both aspects of meaning. According to Taylor, 'if *enough* words are struck at random, the blanks will come to represent proportionally all kinds of words to the extent that they occur' (1953, p. 419).

Methodological Considerations

The striking utility of the Cloze Readability Procedure lies in the ease with which it can be used in test construction. The question of cloze test length must be determined in terms of practical considerations. Taylor (1956) has suggested that a 50-item cloze test provides a sufficient sample for a stable score.

In constructing cloze tests to be applied to the narrative disclosures contained in financial reports, the author chose to delete every fifth word, with the first word to be deleted chosen from a table of random numbers. In this procedure, a 'word' is defined by the white spaces with which the financial report preparer has separated it from the other words in the narrative disclosure. The first and last sentences are not mutilated. Appendix A contains a sample test. The instructions that were placed on the cover sheet of each test appear in Appendix B.

Bormuth's research found the most valid system of scoring cloze tests to be as follows:

> (1) When cloze tests are used as measures of individual differences in reading ability, scores obtained by counting *responses exactly matching* the deleted words seem to yield the most valid scores;
> (2) When the cloze tests are used in readability studies as measures of the comprehension difficulties of passages, scores obtained by counting *responses exactly matching* the deleted words seem to yield the greatest amount of discrimination among passage difficulties (1965, p. 285).

Validity

The ultimate measure of a passage's level of understandability can be ascertained by the degree of the subject's comprehension. If cloze tests are to be used as measures of the understandability of financial report messages, they must be shown empirically to be valid measures of comprehension. Validity data concerns the ability of cloze scores to predict an 'outside criterion' of understandability. This usually means, in practice, the degree of relationship between cloze scores and conventional reading comprehension test scores. According to Bormuth, 'the cloze readability procedure is... buttressed by research [and] is possibly the most thoroughly validated and sophisticated method of testing presently used...' (1975, p. 82).

For example, Taylor (1957), Sukiori (1957), Rankin (1957), Jenkinson (1957), Fletcher (1959), Bormuth (1962), Ruddell (1963), Hafner (1963), Friedman (1964), Gallant (1965), Heitzman and Bloomer (1967), Bormuth (1967), Rankin and Culhane (1969), and Bormuth (1969) obtained statistically significant coefficients of correlation which support strongly Taylor's contention that responses to items on cloze tests (1) provide valid measures of the *comprehension abilities of subjects* and (2) provide valid measures of the *comprehension difficulties of passages.* Bormuth concluded that these studies show that scores on the two kinds of tests are *so highly correlated* that the processes that generate those scores are indistinguishable' (1975, p. 67).

Criterion Levels

There is some value in knowing that one type of narrative disclosure (e.g., a footnote) is more difficult to understand than another type of narrative disclosure (e.g., a qualified auditor's report). There is also some value in knowing that one group of sophisticated users (e.g., certified public accountants) find narrative disclosures to be easier to understand than another group of sophisticated users (e.g., chartered financial analysts). However, a cloze score (by type of message or by type of sophisticated user) has maximum value when we can say that the score does or does not, in and of itself, represent a satisfactory level of performance on the materials from which the test was made. Such reading experts as Betts (1954), Harris (1962), and Bond and Tinker (1967) have advocated the proposition that in order for materials to be suitable for use in a person's 'independent study,' he should be able to answer correctly at least 90% of the questions asked on a conventional comprehension test about the materials.

Researchers have attempted to correlate cloze scores with scores obtained on conventional comprehension tests, so that correspondent levels of proficiency might be ascertained. Bormuth (1968), Rankin and Culhane (1969), Rankin (1971), and Peterson, Paradis, and Peters (1972, 1973) generally concur on a cloze score of 57% as comparable to a conventional comprehension test score of 90% (the 'independent reading level'). Thus, a cloze score of 57% on a financial report message may indicate successful communication between financial report preparer and financial report user. Since this level was arrived at by using different populations and different materials, future research will have to define the specific criterion level applicable to technical accounting communications. That is, after more groups of sophisticated users are tested, an appropriate level equivalent to the 'independent reading level' should be established. In the interim, however, the research literature reviewed suggests a temporary criterion level of 57%.

The Messages Tested

Four different types of narrative disclosures were tested:

The first type of message, designated 'A', was a footnote whose format has become standardised (i.e., the footnote required by Accounting Principles Board *Opinion No. 22* 'Accounting Policies').

The second type of message, designated 'B', was a footnote whose format has not become standardised (i.e., the footnote required by Financial Accounting Standards Board *Statement of Financial Accounting Standards No. 5* 'Accounting for Contingencies').

The third type of message, designated 'C', was a management's analysis of operations required by the Securities and Exchange Commission in *Accounting Series Release No. 159*; its format has become standardised.

The fourth type of message, designated 'D', was a qualified auditor's report required by the American Institute of Certified Public Accountants' fourth standard of reporting; its format has not become standardised. It should be noted that the qualified auditor's report referred the reader to a footnote presumably authored by management; and it was this footnote that was tested. It is reasonable to assume that the auditor, having read the footnote and accepted the content and language structure therein, was tacitly asserting that he would have written the footnote in the same manner.

The following criteria were used to identify standardised messages: (1) The content and form of the message did *not* vary significantly within a source corporation over time. (2) The content and form of the message did *not* vary significantly among source corporations.

The fact that the narrative disclosures tested in this study were read by sophisticated users independent of the other important material contained in financial reports (e.g., financial statements) may have made the messages more difficult to comprehend. This fact should therefore be considered by future researchers in the design of their studies.

The Subjects Selected

Within the accounting profession and the financial community, there is a lack of consensus as to the identity of the intended users of accounting communications. The literature abounds with various suggestions as to the level of user competence that *should* serve as the basis for preparing financial reports. In light of the growing complexities of financial reporting, the *sophisticated user* clearly constitutes the only realistic user. The Financial Accounting Standards Board's recent declaration that 'financial statements should be comprehensible to investors and creditors who have a reasonable understanding of business and economic activities and financial accounting and who are willing to spend the time and effort needed to study financial statements' (1976, p. 10) presents authoritative support for that view.

A total of 1,536 certified public accountants (CPA) was randomly selected from the membership roster of the American Institute of Certified Public Accountants, which totals 118,601 as of 1976. Certified public accountants are sophisticated users of financial reports, in the sense that they are required by generally accepted auditing standards to 'read' the narrative disclosures that supplement and complement the financial statements as part of their overall assessment of 'fairness.'

A total of 1,536 chartered financial analysts (CFA) was randomly selected from the membership directory of the Financial Analysts Federation, which totals 14,500 as of 1976.

Each sophisticated user received two messages chosen at random from the total of sixty-four messages (i.e., 16 corporations × four messages per corporation). No pair was to consist of two messages of the same type, although they might, by chance, stem from the same corporation.

Since both user groups received pairs of messages randomly distributed from the same message/corporation combinations, the requirements for a *crossed design* have been satisfied. Additionally, since each of the 1,536 possible combinations was randomly assigned to the randomly selected subjects, it is reasonable to assume *independence* between subjects selected and message/corporation combinations. However, it is unlikely that each cell would have an equal number of observations, because of a varying response rate (i.e., an *unequal* distribution of observations). This assumption was borne out by the actual number of responses obtained (see Table 1).

The Corporations Tested

A non-random sampling plan was used to select a total of sixteen corporations from the American Institute of Certified Public Accountants' NAARS system. The criterion for inclusion in the study was as follows: for each corporation selected, the narrative disclosures in each financial report had to be approximately 250–300 words in length in order to provide fifty word deletions as suggested by Cloze Readability Procedure researchers. (See Figure 1 for a list of source corporations.)

Data Analysis

In evaluating the acceptance or rejection of hypothesis I, a one-tailed t-test was performed to test the significance of the difference between the observed mean understandability score for each of the four types of narrative disclosures and the criterion level of 57% established by Cloze Readability Procedure researchers as indicative of acceptable performance (see discussion, page 182).

Table 1
Number of Usable Responses per Subject Group, Source Corporation, and Type of Message

	Message A		*Message B*		*Message C*		*Message D*	
	Subjects		*Subjects*		*Subjects*		*Subjects*	
Corporations	*CPA*	*CFA*	*CPA*	*CFA*	*CPA*	*CFA*	*CPA*	*CPA*
16	6	5	5	4	7	8	6	5
15	6	4	7	4	7	4	8	7
14	5	4	5	4	6	5	5	4
13	6	5	5	5	5	8	4	5
12	6	5	6	5	5	5	4	5
11	5	8	4	5	6	7	6	5
10	5	4	6	7	5	6	5	5
9	5	5	5	4	5	5	5	4
8	5	5	6	5	7	6	7	5
7	5	9	4	8	6	4	4	7
6	5	4	5	4	5	5	8	4
5	5	5	4	4	4	4	4	5
4	5	4	7	4	6	4	5	4
3	5	6	5	5	6	4	7	5
2	5	4	7	4	5	7	6	5
1	6	5	5	7	5	6	8	5

Figure 1
List of Source Corporations Selected for Inclusion in this Study

Number	*Name of Corporation*	1974 *EPS*	1975 *EPS*
1	Bangor Punta Corporation	($9.05)	$1.88
2	Wachovia Realty Investments	1.27	(3.06)
3	The Anaconda Company	0.73	(0.47)
4	Allegheny Power Systems, Inc.	1.78	2.52
5	McDonnell Douglas Corporation	2.77	2.27
6	U.S. Realty Investments	0.12	(1.72)
7	United Gas Pipe Line Company	2.10	3.79
8	Cousins Mortgage & Equity Investments	1.29	(15.76)
9	Bourns, Inc.	2.18	0.27
10	Kaneb Services, Inc.	2.58	3.01
11	Recognition Equipment, Incorporated	0.39	0.58
12	Viking General Corporation	0.71	(0.25)
13	First of Denver Mortgage Investors	0.57	(12.91)
14	Harman International Industries, Inc.	2.70	3.02
15	Security Mortgage Investors	(0.22)	(1.27)
16	Banner Industries, Inc.	0.68	0.83

Since the distribution of cloze scores was approximately normal and both variables are interval variables, Pearson Product-Moment correlation coefficients were calculated in evaluating the acceptance or rejection of hypothesis II. Thus, the earnings per share variable with which the individual Cloze Readability Procedure scores were correlated consisted of many tie scores ($n = 16$).

Results of the study

The 1,536 certified public accountants and 1,536 chartered financial analysts returned, respectively, 352 and 328 usable Cloze Readability Procedure tests. Appendix C contains their responses by (1) sophisticated user group, (2) source corporation, and (3) type of narrative disclosure. It should be noted that the mean cloze score in Appendix C represents the average percentage of deleted words *correctly* filled in by certified public accountants and chartered financial analysts and should be judged relative to the criterion level of 57%.

Hypothesis I stated that *narrative disclosures are well understood by sophisticated users.* To achieve communication in financial reporting necessitates that the target audience assign the meanings intended by financial report preparers to the narrative disclosures contained therein. As shown in Table 2, the research hypothesis is rejected for standard format footnotes ($t = 1.696$, $p < 0.01$) and for managements' analyses of operations ($t = -0.5437$, $p < 0.01$). The average understandability scores of 58.4163 for standard format footnotes and 56.5794 for managements' analyses of operations may indicate that, on average, these two *standardised* messages do not communicate to sophisticated users.

Of the four types of messages tested, standard format footnotes and managements' analyses of operations were the most technical, contained the most numbers, and made references to specific financial statement items and amounts. Sophisticated users evidently have the most difficulty understanding a message when its language structure and content take this form.

It was expected that these two types of messages would communicate to sophisticated users, since their language structure and general content do not vary significantly among source corporations over time and should be, therefore, 'familiar' to sophisticated users. Presumably, the technical nature of these two types of messages outweighs their 'familiarity' when sophisticated users attempt to understand the information contained therein.

As shown in Table 2, however, the research hypothesis is accepted for nonstandard format footnotes ($t = 5.356$, $p < 0.01$) and for qualified auditors' reports ($t = 8.673$, $p < 0.01$). The average understandability scores of 61.3841 for nonstandard format footnotes and 64.2792 for qualified auditors' reports may indicate that, on average, these two *nonstandardised* messages do communicate to sophisticated users.

Of the four types of messages tested, nonstandard format footnotes and qualified auditors' reports tend to be descriptions of situations (e.g., a lawsuit) rather than verbal representations of the accounting calculus. The results imply that

Table 2
Testing the Hypothesis that Narrative Disclosures Contained in Financial Reports are Understood Well by Sophisticated Users

Standard format footnotes	*Non-standard format footnotes*
$t = \dfrac{58{\cdot}4163 - 57{\cdot}00}{0{\cdot}835096} = +1{\cdot}696$ $+1{\cdot}696 < +2{\cdot}326$ reject H_0	$t = \dfrac{61{\cdot}3841 - 57{\cdot}00}{0{\cdot}818570} = +5{\cdot}356$ $+5{\cdot}356 \geq +2{\cdot}326$ accept H_0
Management's analysis of operations	*Qualified auditor's report*
$t = \dfrac{56{\cdot}5794 - 57{\cdot}00}{0{\cdot}773527} = -0{\cdot}5437$ $-0{\cdot}5437 < +2{\cdot}326$ reject H_0	$t = \dfrac{64{\cdot}2792 - 57{\cdot}00}{0{\cdot}839237} = +8{\cdot}673$ $+8{\cdot}673 \geq +2{\cdot}326$ accept H_0
General form of the hypothesis	*t − statistic*
$H_0\colon u_x \geq 57{\cdot}00$ $H_1\colon u_x < 57{\cdot}00$	$t = \dfrac{\bar{X} - U_x}{S_{\bar{x}}}, \quad S_{\bar{x}} = \dfrac{S_x}{\sqrt{n}}, \quad S_x = \sqrt{\dfrac{(X - \bar{X})^2}{n - 1}}$

Decision rule

$$\left.\begin{array}{l}\text{If } t \geq +2{\cdot}326, \text{ accept } H_0\\ \text{If } t < +2{\cdot}326, \text{ reject } H_0\end{array}\right\}\text{with } a = 0{\cdot}01 \text{ (one-tailed)}$$

the object language in which management and accountants encode their nonstandardised messages is in the *vernacular* of sophisticated users; and that would explain why they were easier for sophisticated users to understand than either standard format footnotes or managements' analyses of operations where a much greater knowledge of the accounting model is called for.

Hypothesis II stated that *the level of understandability of the type of message varies directly with the change in earnings per share from 1974 to 1975 of the source corporation to a statistically significant degree.* Using a Pearson Product-Moment correlation, Table 3 confirms the research hypothesis for nonstandard format footnotes ($R = 0.2221$, $p < 0.01$) and for qualified auditors' reports ($R = 0.1597$, $p < 0.02$). For the remaining two types of messages, there is no statistically significant relationship, failing to confirm the research hypothesis. The coefficients of correlation were low because there was a very restricted range of scores (i.e., only sixteen different earnings per share variables for the sample size of 680). Consequently, the correlations obtained probably understate reality.

The fact that standard format footnotes and managements' analyses of operations showed no relationship between understandability and performance is not surprising in light of the results obtained with respect to hypothesis I. Standardised messages are not a function of current operating levels, since their semantic (vocabulary) and syntactic (grammar) structure and overall informational content do not vary significantly among source corporations over time.

On the other hand, nonstandardised messages appear to be a function of current operating levels. The correlation coefficients obtained support the 'management-oriented' approach to financial reporting and imply that managers are

Table 3
Pearson Product-Moment Correlation Coefficients for Cloze Readability Procedure Scores with the Dollar Change in Earnings per Share from 1974 to 1975

Type of Message	*Coefficient*	*Significance*
Standard format footnotes	0.0371	0.317
Non-standard format footnotes	0.2221	0.002
Managements' analyses of operations	0.0512	0.249
Qualified auditors' reports	0.1597	0.019
All messages	0.1180	0.001

influenced, perhaps unconsciously, by a 'good' year or a 'bad' year when they write their nonstandardised narrative disclosures. In a related study that looked at other qualitative characteristics of financial reporting (i.e., completeness, accuracy, and reliability), Singhvi and Desai used both the rate of return (net profit/net worth) and the earnings margin (net profit/net sales) as objective measures of managerial performance. They found a statistically significant positive relationship between the quality of disclosure and these two performance measures. They rationalised that:

> When the rate of return is high in a corporation, the management may disclose detailed information in order to support the continuance of its positions and compensations. On the other hand, when the rate of return is low, the management may disclose less information in order to cover up the reasons for losses or declining profits.... The corporation may disclose more information when its earnings margin is above the average for the industry because it is not afraid of being squeezed out in the price competition, and also it wants to assure its stockholders about the corporation's strong position to survive (1971, pp. 134-135).

Arguments similar to the ones presented by Morton (see page 179) and Singhvi and Desai can be offered to explain the empirical results obtained in testing hypothesis II. That is, management knowingly or unknowingly introduces an *interpretive bias* into their nonstandardised messages.

Conclusion and recommendations

Narrative disclosures contained in financial reports *should* be developed by management to communicate objectively to sophisticated users the best available economic and social information about the events and conditions that have affected, are currently affecting, and will affect the business entity in the immediate future.

As a result of testing hypothesis I, standardised messages were found to be incomprehensible to sophisticated users; they were the most technical and nondescriptive of the messages tested. The use of technical terms reflects the technical nature of financial accounting. However, there is enough research evidence indicating that even sophisticated users find some of the technical terms such as 'present fairly' vague and ambiguous. Consequently, it is recommended that financial report preparers seek alternative forms of message presentation (e.g., emphasise descriptive, nontechnical data and de-emphasise non-descriptive, technical data). The Securities and Exchange Commission in *Accounting Series Release No. 159* anticipated the communication problems associated with standardised formats when they urged financial report preparers to avoid 'boiler plate or compliance jargon' in managements' analyses of operations (1974, p. 2). Where technical terms cannot be avoided, it is recommended that a brief definition be supplied: 'Definition facilitates effective communication because it makes explicit the meaning of terms' (Iselin, 1972, p. 35).

More importantly, however, the results of testing hypothesis I suggest that the accounting profession and the Securities and Exchange Commission should limit, within reasonable bounds, any future emphasis on standardising the language and format of narrative disclosures. For example, the Commission on Auditors' Responsibilities, noting that 'evidence abounds that communication between the auditor and users of his work... is unsatisfactory' (p. 71), should reconsider its recent recommendation favouring the use of 'standardized alternative phrases or paragraphs... that change with the circumstances' (p. 75). In place of standardisation, financial report preparers should have *flexibility* in drafting the language and format of narrative disclosures subject to an acceptable level of understandability ultimately defined by a standard setting body such as the Financial Accounting Standards Board. Such a definition may even require the *pre-testing* of financial report messages using an appropriate measuring instrument like Cloze *before* dissemination to financial report users.

Since accounting is an *art*, a specific set of guidelines for financial report preparers to ensure understandable messages cannot be recommended. Improvements in the comprehensibility of standard format footnotes and managements' analyses of operations can result only from *trial and error revisions.* It is conceivable that an *interdisciplinary approach* to report writing might ultimately be the only realistic solution to the complex problems associated with this aspect of financial reporting.

It should be noted, however, that the standardised messages tested in this research study may be inherently more complex because they call for a greater knowledge of the accounting model than the non-standardised messages that were tested. Thus, their understandability is not solely a function of language structure, but of content as well; and this fact should be considered a factor for future research.

As a result of testing hypothesis II, nonstandardised messages were found to be subject to management manipulation. That is, there was an apparent cause/effect relationship between performance (as objectively measured by the change in earnings per share) and understandability (as objectively measured by the Cloze Readability Procedure).

Given human behaviour, the placing of managers in complete control of the accounting communication process which monitors their performance breeds a situation wherein it is perfectly natural to expect that some managers would obfuscate their failures and underscore their successes. To partially satisfy the requirements for objective and impartial reporting on the performance of management, the understandability of narrative disclosures must be as free as possible from the manipulations of management.

Unfortunately, the obvious solution—standardise messages to preclude manipulation—is not viable since hypothesis I has shown that standardised messages were the most difficult for sophisticated users to comprehend. As a possible alternative solution, independent auditors, already responsible for understandability through the concept of adequate disclosure (Statement on Auditing Standards No. 1, 1973, p. 5), could actively participate with management in the drafting of narrative disclosures. Georgeson & Co. reached a similar conclusion when they made the following suggestion to financial executives:

> Don't be afraid to suggest to your auditors that they make... [managements']... financial notes readable. A small number of companies are doing this now. Everyone who reads the notes appreciates it..., especially since the SEC is putting more stress on better communication (1972, p. 14).

The alternative to expanding the role of the auditor more fully to encompass understandability may result in costly lawsuits with their attendant negative connotations for the credibility of the formal financial statements as well as the credibility of the certified public accountant as society's principal attestor. Sommer examined a number of recent lawsuits and concluded that the courts are demanding of auditors that '... disclosure(s) be *intelligible* and helpful to more than a handful in understanding the financial condition and the operations of the company' (1975, p. 160).

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Appendix A Sample Cloze Readability Procedure Test—The Anaconda Company's Standard Format Footnote

The civil actions commenced in 1970 against Anaconda and two of its subsidiaries, now divisions, among others, by two private companies charging violations of the antitrust laws remain pending in the United States District Court for the Southern District of New York. The complaints in both actions ask treble damages , divestiture of the defendants, copper fabricating facilities, and other relief . The company has denied all liability and intends to defend vigorously on the merits. These actions are still in pre-trial discovery. Plaintiffs have not specified the amount of damages sought by them. Counsel for the company do not believe, on the basis of the information thus far developed, that the actions should have a material effect on the company's financial position.

In 1972 the US Department of Justice commenced a grand jury investigation with respect to the pricing of refined copper and the exploration, mine development, mine production, smelting and refining of such copper. Subpoenas calling for the production of documents were served upon Anaconda , other major copper producers in the United States, and certain trade associations. In response to these subpoenas, Anaconda made a submission of material. The Justice Department has commenced the taking of testimony of witnesses. Several present and former employees of the company have been tentatively scheduled to appear before the grand jury.

The suit commenced in 1969 by an agricultural corporation against the company and other mining companies with operations in the area south of Tucson, Arizona, remains pending. Plaintiff seeks an injunction to prohibit the pumping and transportation of underground water by the mining companies from wells located within the Santa Cruz River Basin and includes in its complaint a claim for damages in the amount of $70 million . Although trial has not yet taken place, the basic legal issue in the suit is now before the Supreme Court of Arizona for decision, following a ruling favorable to defendants on this point by the lower court.

Appendix B

Instruction Sheet accompanying each Cloze Readability Procedure Test

This test consists of a series of passages taken from an annual report. A number of words have been taken out of each passage, and in the place of each word you will find a space which is underlined. Your task is to predict, for each blank space, the precise word which was taken out and to write this word in the space provided. In other words, you are to try to guess exactly what words the writer used in preparing this annual report. Your ability to make correct predictions should reflect your sensitivity to clues provided by the surrounding context of each word as well as your knowledge of accounting and/or finance.

Some words will be easier to guess than others. For example, if you were to find the following sentence, 'The company used the straight-line method of ________ for its tangible fixed assets,' you would probably have little difficulty in predicting 'depreciation' as the word which has been taken out. On the other hand, if the sentence had been, 'The company used the ________ method of depreciation for its tangible fixed assets,' the correct prediction would have been more difficult. Whether the prediction is 'easy' or 'difficult', make the best guess you can in each case and please do *not* leave any blank unfilled.

You will find it helpful to go through each short passage twice. On the first time through, get a general idea of what the passage is about and fill in the 'easier' blanks tentatively. On the second time through, correct the mistakes and misconceptions you may have held during the first reading.

For the purpose of this test, a 'word' is defined as a symbol surrounded by two blank spaces: In terms of this definition, an abbreviation (e.g., CPA), a number (e.g., $1.00), or a hyphenated construction (e.g., straight-line) would each be considered as one word.

Appendix C
Cloze Readability Procedure Scores by Source Corporations for Certified Public Accountants and Chartered Financial Analysts

		Message A			*Message B*			*Message C*			*Message D*		
		Mean	*σ*	*N*	*Mean*	*σ*	*N*	*Mean*	*σ*	*N*	*Mean*	*σ*	*N*
Certified Public Accountants	Bangor Punta Corporation	57.48	3.27	6	69.20	8.07	5	48.00	12.88	5	73.25	7.48	8
	Wachovia Realty Investments	66.40	9.10	5	56.20	5.10	7	52.69	6.88	5	60.51	11.86	6
	The Anaconda Company	72.00	10.86	5	48.16	6.86	5	60.00	10.73	6	62.00	2.58	7
	Allegheny Power Systems	48.80	9.44	5	65.43	2.51	7	59.00	9.86	6	56.00	14.14	5
	McDonnell Douglas Corporation	41.96	5.82	5	46.70	10.49	4	54.91	10.85	4	50.47	7.12	4
	U.S. Realty Investments	63.89	7.92	5	64.45	6.73	5	62.35	8.92	5	64.32	6.34	8
	United Gas Pipeline Company	55.92	4.97	5	62.50	5.26	4	44.55	5.89	6	66.67	12.50	4
	Cousins Mortgage & Equity Investments	50.76	5.86	5	58.67	11.43	6	53.18	3.66	7	62.18	7.31	7
	Bourns, Inc.	63.92	10.89	5	56.73	9.78	5	56.73	3.92	5	59.65	15.60	5
	Kaneb Services, Inc.	63.26	13.84	5	69.73	9.78	6	55.60	9.94	5	73.60	6.84	5
	Recognition Equipment Corp.	64.23	4.63	5	64.35	16.86	4	48.40	14.77	6	46.32	15.02	5
	Viking General Corporation	57.37	10.97	6	69.04	7.88	6	57.55	6.35	5	62.95	7.63	4
	1st of Denver Mortgage Investors	57.67	11.55	6	56.14	7.02	5	51.92	14.45	5	63.33	6.91	4
	Harman International Industries	74.40	5.90	5	62.80	6.26	5	66.33	7.09	6	68.98	10.54	5
	Security Mortgage Investors	57.33	6.15	6	68.00	5.66	7	56.57	6.50	7	73.00	8.07	8
	Banner Industries, Inc.	59.66	12.80	6	61.20	5.40	5	65.14	11.01	7	74.66	7.55	6
Chartered Financial Analysts	Bangor Punta Corporation	49.39	8.46	5	60.00	7.66	7	59.33	7.76	6	71.20	9.86	5
	Wachovia Realty Investments	62.00	1.63	4	65.56	10.82	4	49.45	9.13	7	54.78	9.14	5
	The Anaconda Company	61.66	4.80	6	48.16	8.11	5	66.50	11.93	4	68.00	12.49	5
	Allegheny Power Systems	48.00	5.89	4	56.50	7.72	4	49.50	8.06	4	59.50	6.40	4
	McDonnell Douglas Corporation	49.17	6.77	5	65.09	31.63	4	61.61	6.92	4	53.58	8.29	5
	U.S. Realty Investments	70.85	4.94	4	66.20	5.73	4	61.96	8.84	5	51.04	7.70	4
	United Gas Pipeline Company	59.88	6.41	9	59.37	6.02	8	39.42	7.93	4	66.11	10.72	7
	Cousins Mortgage & Equity Investments	48.85	8.88	5	58.80	8.79	5	50.93	6.60	6	63.14	6.99	5
	Bourns, Inc.	51.99	3.53	5	62.50	3.16	4	55.51	4.87	5	65.35	11.22	4
	Kaneb Services, Inc.	54.59	10.85	4	69.97	4.03	7	55.67	2.34	6	74.00	2.00	5
	Recognition Equipment Corp.	57.45	11.83	8	68.52	2.93	5	57.42	6.22	7	60.09	5.04	4
	Viking General Corporation	52.69	11.82	5	63.93	11.04	5	55.51	9.05	5	62.50	9.62	5
	1st of Denver Mortgage Investors	61.60	13.07	5	46.31	11.00	5	62.02	10.21	8	67.11	4.27	5
	Harman International Industries	71.00	7.39	4	66.00	7.48	4	60.80	4.60	5	71.94	8.23	4
	Security Mortgage Investors	53.00	8.25	4	59.00	7.74	4	59.50	9.15	4	64.28	9.76	7
	Banner Industries, Inc.	63.20	7.56	5	63.00	4.76	4	66.75	11.21	8	70.00	9.80	5

Sandilands and the Logic of Current Cost

Harold C. Edey

The Sandilands philosophy

At an early paragraph in its Report the Sandilands Committee defines a company's profit by adapting the well-known Hicks definition of an individual's income [Hicks, 1946, p. 172]. The adaptation reads: 'A company's profit for the year is the maximum value which the company can distribute during the year, and still expect to be as well off at the end of the year as it was at the beginning' [Inflation Accounting, 1975, paragraph 98]. For a company, continues the Report, the same degree of well-offness means maintaining its capital intact. If we were granted perfect knowledge of the future, the quantification of this capital would be fairly clear. It would be the discounted net present value of all future net cash flows arising for the company [paragraph 100]. The Report gives examples that indicate that cash flows here mean cash flows distributable to the shareholders [paragraphs 101 and 102].

Surprisingly, the Report does not quote Hicks' alternative definition of maintenance of well-offness, which for companies would be the maintenance of the level of cash flow distributable to shareholders. This is not the same concept as the first unless the discounting rate is held constant and it can be argued with some plausibility that it is a better model of the commercial view of profit than the first. However, as the procedures recommended by the Report do not, as I shall argue, fit into either definition, the point is perhaps an academic one.

Hicks, it will be remembered, also notes that if the monetary unit were not stable it would be necessary in measuring income to deflate the changing monetary values by using a suitable price index related to the consumer's spending pattern: translated into company terms this would presumably be the average shareholders' spending pattern. However, this idea is firmly rejected by the Report [paragraph 129].

After referring to the Hicks concept, the Report says that as it is impossible accurately to forecast future cash flows, the concept cannot be used directly: 'Other concepts must be considered which approximate to it and which are capable of practical application' [paragraph 103]. It then examines what it describes as five alternative concepts of profit, each associated with a corresponding concept of capital maintenance, and selects, as the most useful method of accounting for inflation in the longer term, one based on the use of the monetary unit as the unit of measurement, under which profit is 'gains arising during the year which may be distributed after charging the 'value to the business' of the company's assets consumed during the year' [paragraphs 128 and 143]. (Here it speaks of profit; elsewhere it uses the term 'operating profit', and in paragraph 201 'operating profit' is equated with 'profit for the year'.)

The 'value to the business' of an asset is identified with the concept of deprival value, used by J. C. Bonbright [Bonbright, 1937]. This is the amount which would just compensate the company if it were suddenly to be deprived of the asset. The method of estimation of deprival value specified in the Report [paragraph 219] can be summarised in the formula: 'the lower of current replacement cost (depreciated replacement cost in the case of fixed assets) and the best discounted recoverable value by sale or use'.

The Report makes clear that liabilities should, in principle, be dealt with similarly, i.e. treated as negative assets, but accepts that practical difficulties may limit the application of the principle [paragraph 593].

A valuation on the basis of deprival value does not, as we know, imply that the asset in question is to be replaced: only that the owner of the asset could be fully compensated for its loss if paid this amount. Bonbright's definition requires that consequential side effects, such as loss of earnings during replacement, be taken into account. The Report does not, however, deal with these niceties.

The measurement of capital maintenance is thus specified indirectly by laying down a procedure for calculation of profit. The Report believes that this procedure produces the most useful figure for the majority of users of the accounts [paragraph 522].

So, despite the earlier reference to the Hicks definition, the interpretation of capital maintenance as the maintenance of the shareholders' investment in the company, whether in terms of the currency unit or of general purchasing power, is abandoned. Instead, the Sandilands approach becomes the practical one of choosing what seems to be the most useful set of figures for those interested in the financial state of the company.

The procedures developed in the report for the calculation of operating profit require 'value to the business' to be assessed at the time of consumption of the asset, in principle at the time that the sales revenue accrues, though the Report suggests the use in practice of an averaging method for stocks consumed, and an end-year figure for depreciation [paragraphs 594 and 606]. The adjustments to bring the book values of assets to current deprival value produce 'holding' gains or losses, to be credited or debited to reserve accounts—the 'revaluation reserves'—which I shall hereafter refer to as 'reserves for capital maintenance'.

(It is worth noting that as the amount recoverable by sale or use of an asset must be estimated in order to determine whether its value to the business is below its written-down replacement cost, the assumptions and estimates needed are similar in kind to those needed for investment decisions, including decisions relating to the retention of the asset.)

The Report says expressly that the concept of profit which it has chosen does not imply the maintenance of the physical assets which the company happens to have, or the purchasing power invested in these assets [paragraph 129]. This rejection by the Report of any correction for the change in the value of money in measuring profit means that monetary assets and liabilities—cash and claims fixed in money amount—cannot therefore give rise to reported gains or losses [paragraph 537]. On the other hand, as noted below, a consideration of the recommendations shows that in effect the procedures will generally lead to a calculation based on the maintenance of the existing physical assets or of their potential physical output.

Consequences of the Sandilands procedures

I think it is generally accepted that deprival value gives a better assessment of the current economic cost of using fixed assets and stocks than does historical cost, whether under conditions of inflation or not. It is therefore a significantly better guide for management and government on the use of resources. It is true that the measurement is far from perfect. The existence of intangibles, and of complementarity among groups of assets, prevent the sum of the deprival values of the separate recorded assets from being in general a satisfactory indicator of the deprival value of the undertaking as a whole [Edey, 1974]. Nevertheless, provided these limitations are understood, deprival value seems to be as good a basis of valuation as is at present available for use in annual financial statements as we know them. In the end this can only be settled on the basis of experience.

However, if one is to assess the full significance of the Sandilands procedures, one must bear in mind that, as already noted, the debits and credits to profit and loss account for cost of sales and depreciation are based on the deprival value costs *at the time of consumption*, not at the beginning of the year of account. The Sandilands measure of capital to be maintained is based, in effect, on the amount of money value needed to replace the 'bits used up' of the particular mix of assets which happens to be held when the revenue arises, and on the basis of the deprival value at that time. As the mix of assets changes through time, the 'capital' or 'substance of the business' changes with it, so that the capital to be maintained becomes the sum of the changing deprival values of a changing collection of assets.

The Sandilands operating profit cannot therefore be regarded as the surplus remaining after maintenance of capital as it was at the beginning of each year, whether that capital is defined in physical or in value terms.

Furthermore, the procedure to be followed in practice for the assessment of deprival value is likely to vary sufficiently to cause variations in the implied capital maintenance concept unless the latter is defined broadly. If deprival value is given its strict meaning, it is measured by the amount of money which would just compensate the company for the loss of the asset concerned. In principle the deprival value of an asset is the capitalised value of the forecast loss in future cash flow caused by the hypothetical deprival, all other existing assets of the company being assumed retained. In practice, however, the measurement will usually be cruder. In many instances the 'replacement cost' will be interpreted simply as the cost, based on a price list, index number or estimate, of replacing the same asset in the same condition. Or the estimate may reflect the cost of replacing the physical output capacity, with or without an allowance for different operating costs where the new asset differs from the old. (In this context it may be noted that, in general, official index numbers of asset prices do not allow for changes in the operating cost of the assets to which they refer.) Maintenance of the 'replacement cost' could therefore imply in practice maintenance of the same physical asset, maintenance of the same physical output, maintenance of the same cash flow or maintenance of the present value of that cash flow, according to the actual method of calculation selected. Where calculation is based on the recoverable amount from use or sale of the asset (because this is less than the calculated net replacement cost) the maintenance of the asset's deprival value will imply the maintenance of the present value of the asset's expected future cash contribution.

Under the Sandilands system a company could continue to report profit in a year in which a significant fall occurred in the replacement cost and money earning power of its assets when the price level of most other goods and services was constant or rising. Indeed, if operating revenue kept up in the short run, reported profit might even increase because of the fall in depreciation or cost of sales. Only when operating revenue began to fall would the deterioration in earning capacity be signalled in the profit and loss account. It does not indeed follow that users of the financial statements would be deceived: movements on the reserve for capital maintenance would tell the story when interpreted along with the profit and loss account, as the Report recommends. The point does, however, illustrate one of the effects of tying the quantum of capital to be maintained to movements in the price level of the assets the company happens to have from time to time, as distinct from the general purchasing power of its asset values at the beginning of the period, and emphasises the departure of the Sandilands recommendations from the basic Hicks model.

'Distributable profit'

The Report considers that operating profit, as it defines it, is a better guide than historical cost profit to the amount available for dividend appropriation [paragraph 544], but it also makes it clear that there are circumstances when it would be right for less or more to be regarded as available. Thus [paragraph 540] 'holding gains which accrue outside the profit and loss account will be of importance to the reader of the financial statement' (and presumably to the directors in considering dividend policy); and the Report states that where a company's purpose is to generate holding gains these may reasonably be described, when realised, as 'profits' (though not as 'operating profits') [paragraph 718].

The conclusion must be that the Sandilands Committee did not intend operating profit to be used as an iron measure of distributable profit in either a business or a legal sense; its use was rather to act only as a 'first approximation' indicator of the amount which could be distributed without 'weakening' the business [paragraph 96]. The concept of maintenance of 'capital' or of the 'substance of the business' underlying the Sandilands procedures can thus only be defined in very general and rather subjective terms. The final decision on what is 'distributable' is left to the directors.

Exposure Draft 18

The Inflation Accounting Steering Group (IASG) was set up to implement the Sandilands proposals and was required to base its recommendations on the Report. It is, therefore, not surprising that the proposals of the Accounting Standards Committee, set out in Exposure Draft 18 (ED 18) and based on the work of the IASG, followed the Sandilands philosophy. The profit and loss account, showing the operating profit calculated in the Sandilands way, was to be accompanied by an appropriation account. The latter was to show the extent to which the operating profit needed to be modified, upward or downward, in order to indicate the directors' views of the amount which could reasonably be regarded as attributable to the shareholders' interest in the company. Attached to this there was to be an explanation by the directors of the way in which they had arrived at this amount. [Accounting Standards Committee, 1976, paragraphs 22–24]. This approach left the final results for the year defined only in the broadest of terms and the interpretation of these to the directors.

This has led to much criticism. Superficially, it might appear to be a sharp departure from existing practice, which has, since 1948 at least, taken the view that the 'profit available for distribution' is to be determined on the basis of accepted accounting rules, though it is known that an element of subjective judgement cann be excluded, for example on questions such as stock valuation, depreciation and treatment of intangibles. It can, however, be argued that the unavoidable element of subjectivity in assessing the reality of a company's financial state is so great—particularly in relation to the value of intangibles and changes in these—that no reasonably objective profit measurement is compatible with a close approximation to economic or business reality. It is certainly a delusion to believe that profit measurement as we have known it in the past is, or can be, both 'factual' and 'objective' [Edey, 1973). The Sandilands Report itself says: ' "Profit for the year" is a practical business concept used as a guide for prudent decision making by companies. It may usefully be defined as the amount of the total gains arising in the year that may prudently be regarded as distributable. It is thus a subjective concept...' [paragraph 95].

It should also be pointed out that the concept of operating profit defined by the Report, and in ED 18, represents no giant departure from the existing long-recognised and accepted practice of some companies. A company which made use of the base stock method of valuation of stocks, or of LIFO, and which annually revalued its fixed assets and depreciation on a replacement cost basis, would report a profit which would often be no bad approximation to a Sandilands operating profit. LIFO it is true is not at present a standard method of stock valuation in the British Isles (though not illegal for company reporting), but it is respectable elsewhere; and there is nothing very new in the base stock method. Recalculation of depreciation on a current cost basis, with or without revaluation of the assets in the balance sheet, is quite respectable in the British Isles.

Why then the fuss about the appropriation account and the leaving to the directors—with a requirement of full explanation—of the final assessment of what is potentially distributable without damaging the company's future? How does this differ from the approach under historical cost accounting, where everyone should know that the 'profit' balance is highly conventional and certainly not a definitive statement of economic or business reality, and where the directors make the dividend decision, though without the requirement of an explanation of its rationale?

One explanation may be that many people still do not appreciate that all practical profit reports must be conventional, though the conventions may differ and some may be better than others. The Sandilands Committee in issuing its Report, and the IASG and the Accounting Standards Committee (ASC) in preparing and issuing ED 18, took the view that the current cost operating profit convention is better than the historical cost one.

Strong exception was taken by some auditors to the subjectivity of the appropriation account, and the 'leaving to the directors' of the final determination of what is 'distributable', even though auditors have been satisfied for many years to state their view on the historical cost profit balance, and to leave to the directors the decisions on dividends and appropriations to reserves provided the law is not violated. Under ED 18 the directors would be required to state the basis of their assessment of the final results reported by them, and it would be possible for auditors to test whether their statement was consistent with the way in which the actual amount disclosed had been calculated, in the same way that auditors test the consistency of profit forecasts against the stated assumptions on which they are based.

However, it must be admitted that legal difficulties could arise in the absence of a single figure clearly denominated as 'profit'; these could arise from existing contractual arrangements, and also if the dividend law were more tightly defined than it is at present in Britain, so that an annual 'profit' figure was required to interpret it.

The Sandilands philosophy seems to have been more acceptable to some business managements than others. Some have joined with many accountants, auditors, financial analysts and academics, in pointing out that full distribution of the Sandilands profit would in some cases—notably banks—lead to erosion of the shareholders' capital, whether measured in terms of maintaining the shareholders' interest in the existing physical entity, or in a more general sense of preserving the investment in real terms having regard to the depreciation of the currency; and that in other cases full distribution would still leave the shareholders' interest enhanced in some real sense. These points can be met by leaving the matter to the discretion of the directors, but it is clear that for many people these objections reflect a desire that financial reporting should be based on a well-defined model of capital maintenance to which the practical measurements can approximate. At the more extreme end of the spectrum of opinion is the naive view that the whole financial reality of a year's operations of a company can be expressed adequately in a single figure.

The prevailing philosophy of the Sandilands

Report seems to be that the central aim of the financial statements should be to provide a useful set of information and that the figure of profit is not unique. Under this view, whether one particular figure or another is called 'profit' is of lesser importance than the usefulness of the statements as a whole. Indeed, such has been the confusion and misunderstanding in the debate on this question that there is much to be said for abandoning the use of the word 'profit' altogether. The Report does however seem to have difficulty in making up its mind. In some places 'usefulness' is put in the forefront, with emphasis on the conventional nature of any profit figure and the arbitrariness of any choice between concepts. Elsewhere the Report seems to elevate its 'operating profit' to a position where it begins to acquire unique validity. For example, in paragraph 739 the Report claims that its operating profit is the profit that could be maintained (and presumably distributed) in the future if all conditions surrounding the company's operations remained the same. But, as noted already, and demonstrated early in the discussion which followed the issue of the Report, the exclusion of any adjustment for the effect of changing price levels on monetary assets and liabilities would mean that some companies which distributed the full Sandilands profit would find themselves short of working capital; and others would have a surplus [see e.g. Inflation Accounting Steering Group, 1976, Paper 18].

Alternative models

There is certainly a strong and fairly widespread desire for a single figure of profit which, if not perfect, is at least a reasonable approximation to some well-defined model, and from which among other things an earnings per share figure can be calculated. Unfortunately there is no general agreement on a precise concept or model. In what follows I shall examine some of the problems that arise when an attempt is made to graft procedures on to the Sandilands model in order to produce the unique figure of profit desired.

One problem arises because the Sandilands proposals, systematically applied, exclude from the profit and loss account gains or losses that arise from trading operations in the same market. For example, a successful purchasing policy may enable a company to record a holding gain on stocks, but under Sandilands principles this is excluded from operating profit. A company whose business it is to deal in a commodity market will show virtually all its gains in the reserve account; its expenses will appear in the profit and loss account. Under the philosophy of 'looking at all the figures' to assess results there is perhaps no problem. However, this does not satisfy people who want the relevant results concentrated in a single figure of profit or in a single earnings per share figure. Nor is a profit that excludes this amount likely to be accepted by the Inland Revenue for tax assessment. There is indeed no reason to suppose that skilful purchasing is necessarily less productive, nationally or for individual businesses, than skilful selling or manufacturing. But no acceptable test has yet been found—or is likely to be found—for deciding how much of such gains should be transferred to profit and loss account while adhering to the general Sandilands approach. It is difficult to see any effective solution that does not involve the separation of real from fictitious or inflationary gains by the application of a general price index.

This demonstrates a particular problem that arises from the physical concept of capital maintenance implied by the Sandilands operating profit. Much more attention however has been directed to the question of the so-called 'monetary items'.

There have been two quite different conceptual lines of approach to this question, both outlined briefly in the IASG's *Background Papers* [Inflation Accounting Steering Group, 1976, Paper 18]. Both are departures from the spirit of the Sandilands philosophy, in that each aims at producing 'the profit' rather than 'a profit'.

No empirical tests yet exist to tell us whether either of these, or the more pragmatic approach of Sandilands and ED 18, produce the 'best'—which is presumably the most 'useful'—results. Nor indeed are the supporters of either alternative agreed on the test of usefulness, and in particular whether this should be the ability of the user to improve prediction of the company's future and judgement of its past (both essentially the same so far as information needs are concerned [Edey, 1970]) or some other purpose requiring less subjectivity, such as tax assessment.

Each of the two lines of approach has variants, but it will be convenient to describe each by reference to one of its specific variants, using the initials of writers who have been closely associated with each. I shall call one the Baxter or *B* system, the other the Gynther or *G* system, after academic exponents of the two basic ideas [Baxter, 1975, and Gynther, 1966]. It is a fortunate coincidence that *G* also stands for Gibbs and for Godley, the names of contemporary contributors to the debate whose views are an extension of the main Gynther line [see Inflation Accounting Steering Group, 1976, Paper 18]. As however they advocate an extension of practice into an area rejected, as I understand it, by Gynther, I shall refer to their variant by the letters *GG*.

The *B* system (called the 'Ideal' system, in the IASG paper already mentioned) could equally be called the 'CCA/CPP' system, as it is in effect a combination of the Sandilands/ED 18 CCA system of deprival valuation with a constant purchasing power system of the type specified in the provisional accounting standard of 1974 [Accounting Standards Committee, 1974]. Under this system the capital to be maintained is defined as the value of the shareholders' equity at the beginning of the year, uplifted by the percentage increase in a suitable index of the rise in the general price level during the year of account. Only part of the holding gains are real—the part which reflects a percentage rise in value greater than the general inflation. This 'real' part is fed back to profit and loss account immediately or as it is realised over the life of the asset; the 'fictitious' part attributable to inflation is retained in the reserve for capital maintenance. When there is no inflation, the fictitious part is of course zero, and all gains or losses are fed into profit and loss account as they are realised (or immediately if no realisation criterion is imposed). The system operates in reverse when the general price level is falling.

In its most developed form the transactions during the year are translated, by application of the general price index, to currency of the same date; for example, a transaction of £100 that occurred midway through a financial year, say on 30 June, would be re-stated using the number of pounds that had the same purchasing power at 31 December as did £100 on 30 June. In this way the accounts are 'stabilised'—expressed throughout in money of the same purchasing power—so that the results are all measured in a constant unit that is the same for all companies whose accounts end on a given date.

Under this system, whether or not the final step of stabilisation is taken, monetary assets held during a period of inflation will, by definition, throw up a loss, to be charged to profit. Similarly the financial statements will show a gain from holding monetary liabilities which is the counterpart of the lender's loss: where this gain is not realised at once, as in the case of longer-term liabilities, it can be retained in a reserve and fed into profit and loss account over the life of the liability. Naturally, such gains will be cancelled out by real losses to the extent that the assets have failed to rise in value in proportion to the inflation, but the accounts will split the overall effect into its constituent parts (a point misunderstood by some in assessing the practical application of the CPP method when it was introduced in the British Isles in the form of a supplementary statement).

If there is some long-term debt, distribution of the full *B* profit will, in general, in conditions of inflation, necessitate some increase in such debt in money terms if assets are not to be reduced or additional equity capital raised; this reflects the fall in capital gearing that will already have occurred through a rise in money value of the proportion of physical assets financed by debt.

The system thus deals automatically with the problems of monetary items and dealing profits. It is a shareholder-oriented system, in the sense that its rationale of profit measurement is that of showing the results as they affect the equity shareholder's interest insofar as these can be indicated by the use of current costs based on deprival values and removal of the effect of the depreciation of the currency. It is the only system of those I am discussing that applies a general inflation adjustment to the measuring unit, and it is the only one that can be described as 'inflation accounting' in the strict and full sense.

In a period of zero inflation the *B* system would in general report a profit equal to the Sandilands operating profit: the *G* system would do so only by chance. The latter extends the basic Sandilands system by adding, to the physical entity whose maintenance determines the zero level of reported profit, the monetary working capital associated with it. This involves applying to the net monetary working capital, positive or negative, an index adjustment the size of which is determined by the change in value of the varying mix of physical working capital (stocks) held. Insofar as the current liabilities exceed the current monetary assets, an increase in the cost of stock is automatically financed (assuming the credit terms are unchanged) and, it is argued, can be reported as profit; so that to this extent holding gains on stock can be brought into the profit and loss account instead of being retained in a reserve for capital maintenance. If, on the other hand, the current monetary assets exceed the current liabilities, additional provision is made by debiting profit and crediting the reserve for capital maintenance in order to provide for the extra finance associated with the stock holding. These adjustments are in principle, like the stock revaluations, made continuously through the financial year, but in practice may be based on some kind of averaging. The system is not directly linked to inflation or deflation and can produce monetary adjustments when the general price level is stable.

The *G* system described by Gynther is not shareholder-oriented. The capital to be maintained is that of the business entity, whether financed by share capital or by loan capital. If 'profit' calculated on this *G* system was distributed in full in circumstances where the company had some loan capital, and when asset prices were rising, there would be an annual decrease in capital gearing as measured in terms of current values. The *GG* system takes account of this by regarding the holding of non-current monetary liabilities as reducing the need for a full retention of holding gains: in effect, this amends the *G* concept of capital maintenance to a shareholder-oriented one. As originally put forward, the system would bring into the final balance of reported profit all holding gains, whether realised or unrealised, insofar as they could be regarded as attributable to finance which was provided by net creditors and loans; the system as sketched out by Gibbs would however show the *G* profit separately in order to indicate the amount of profit which was 'automatically' financed by the extension of net trade credit as stocks rose in value or the additional retention needed in respect of net monetary assets in working capital. Under inflation, and where there was some long-term debt, the distribution of the full *GG* profit would in general necessitate some increase in debt finance if assets were not to be reduced, reflecting as in the *B* method the previous fall in effective gearing as physical assets rose in value. Adjustments of this type are now sometimes known as 'gearing adjustments' [Accounting Standards Committee, 1977].

As put forward by Gibbs therefore, the distinction between the operating profit after the working capital adjustment, and final profit for shareholders after allowing for the effect of long-term debt, is seen in terms of the availability of cash flows, so that the conceptual basis begins to approach that of cash flow reporting and move away from that of direct measurement of the amount needed to maintain capital value. Gynther, if I understand him, would regard the calculation of the operating profit of the entity—the net assets financed by capital, reserves and long-term debt—as the final step, and the calculation of any benefit derived by the shareholders from the existence of long-term debt as something for the individual shareholders to figure out for themselves [Gynther, 1966, p. 151].

B and *G* type systems provide rules for dealing, each in its own way, with the 'problem' of monetary assets. Unlike the *B* system, but like Sandilands, the *G* type systems in effect base the uplift needed to maintain what they regard as the business entity on an implied index of the changing deprival values (or on some interpretations, replacement costs) of the varying mix of physical assets; adjustment is not directly linked to general inflation.

Acceptability and problems

The *B* concept does not seem to be acceptable to business men and practitioners, at any rate at present. This is perhaps because it has received relatively little attention and has not been widely studied, but also because of what I consider to be a mistaken view that indexation in *measuring* will lead to indexation of *transactions*. Some of those who have examined it have misunderstood it, sometimes because of a failure to comprehend fully the mechanism of inflation, and sometimes through not appreciating that a general price index can be useful even if not technically or theoretically perfect. The system undoubtedly appears at first glance rather complicated and this in itself is unlikely to commend it to practitioners and business men; though initial difficulty of comprehension is sometimes a price worth paying if it enables subsequent difficulties to be met on grounds of principle. For those who do not accept the pure Sandilands philosophy and wish for a unique figure of profit, it avoids some of the problems that arise when a *G* type solution is pursued. Some of these I shall now discuss.

One of these problems has already been discussed in connection with the Sandilands operating profit: insofar as the business or part of it is that of dealing in a well-defined commodity, in a single market, the *G* system provides no usable principle for separating dealing profits from retentions in reserve for capital maintenance. Any standard or established set of procedures must fall back on an arbitrary rule.

A major problem arises in deciding which assets are to be treated as 'monetary'. At first it seems right to define monetary assets as those fixed in terms of currency—e.g. pounds sterling. However, on further consideration the question is more puzzling. For example, assets with a face value fixed in currency, can nevertheless fluctuate in value: short-term government stocks are an example where such fluctuations are visible because there is a good market. Is indexation to be reduced (or increased) to the extent that such assets have risen or fallen in value by amounts that may have no close relation to the changes in the prices of the physical assets? Are gold bullion, or overseas money balances, 'monetary assets'? In the *B* system these questions may affect the classifications in the profit and loss account, but do not affect the size of the profit balance. In the *G* system they can affect the amount of profit reported.

Banks and other financial institutions raise particular problems of principle for the *G* method because of the operational vagueness of the concept of the business 'entity'. What index is to be applied to the monetary items? The entity to be preserved cannot be seen as a collection of fixed assets and physical stocks. If we define the entity in terms of its money value we are driven back to historical cost or, if we wish to measure in units of constant value, to the *B* system. If we wish to define the 'entity' physically we can only do so in some such terms as the 'ability to continue to provide the same level of banking services', whatever that may mean. In practice therefore we have to revert to the use of a general price index, carefully avoiding the suggestion that we are using *B* concepts.

Another question arises where such fixed assets as government stocks are held, e.g. by financial institutions, as long-term investments. Are these to be regarded as part of the corporate entity, and an indexed adjustment applied? This is a particularly knotty question for those who support the *G* but not the *GG* system; if the company's borrowing is increased substantially and the funds made available are invested in securities, has the 'entity' changed? And if so, why should provision not be made for losses to the extent that the securities fail to keep up with the rate of inflation?

This is a special case of a type of problem which arises generally from the attempt to define and measure the profit of the entity as distinct from that earned for the shareholders. The definition of the entity not only runs into the difficulty that the same funds can finance a mix of assets that varies through time and hence is not even a physical constant; it also requires the separation of long-term debt finance from finance which is part of the working capital and therefore of the entity. In real life—and in theory—these things are not sharply separated, for one type of finance shades gradually into another, and business is not static. Is a bank overdraft a (negative) part of the entity? Does a company that switches from finance from creditors to overdraft finance change the size of its entity?

I can see no answer to these problems within the framework of the *G* or *GG* system that does not involve the application of arbitrary rules (the consequences of which in all circumstances cannot be foreseen). The concept or concepts of capital maintenance which these procedures may be said to apply can, I think, only be stated in some such terms as, so far as operating (*G*) profit is concerned, 'maintenance of the average physical entity broadly defined, together with the finance needed to support this entity at its current level'. The profit after adjustment for the contribution of the long-term debt (the final *GG* profit) can then perhaps be stated as the surplus available for shareholders after allowing for maintenance of their interest in the same entity.

Conclusion

The *B* system is I suspect about as near an approximation as one could get to a practical measurement based on the Hicks model. Its major practical and theoretical defects (shared with the historical cost and the *G* systems) are firstly its inability to deal adequately with intangibles and with the problems that arise from aggregating the deprival values of complementary assets, and secondly its adherence to a conventional realisation test in recognising profit (which, however, is probably a practical necessity in view of the other defects, and certainly a legal one).

I find it more difficult to relate the *G* and *GG* systems to any precise economic model. However, I wonder whether it is necessary to do so. In the end no practical *ex post facto* measure of profit can be perfect or 'right' in an absolute sense as there is no obvious way of bringing all the intangibles into the accounting measurement. All accounting procedures are conventional and all have to be interpreted. It is perhaps enough that if there is good understanding of the methods used, conclusions—or at least conjectures leading to further enquiry or consideration—can be drawn in the knowledge of their limitations, and that judgement of the best method must be left to experience and empirical research. This, however, is a conclusion unlikely to satisfy those who wish to find the answer in a single specified and objectively verified set of general purpose rules of profit calculation.

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On the Use of the Accounting Rate of Return in Empirical Research

Geoffrey Whittington*

Introduction

Accountants are acutely aware that, despite the proliferation of Accounting Standards, published financial statements contain a good deal of subjective judgment and variety of practice, which make them not strictly comparable between the same company for different years (time series analysis) or between different companies for the same year (cross-sectional analysis). Furthermore, the recent debate on accounting in a period of rapid inflation has served to emphasise that accounting measures of value and income are very different from those of the economist, and a series of academic papers, Harcourt [1965] and Solomon [1966] being seminal works, has demonstrated that there can be important divergences between the Accounting Rate of Return (ARR)[1] and the Internal Rate of Return (IRR) on investment, the latter being the more relevant return for the appraisal of economic performance. In these circumstances, it is not surprising that many accountants are sceptical of the value of using the ARR, calculated from published accounts, in empirical research, particularly in economics,[2] but also in the area of accounting and finance.

In this paper, we shall be concerned with the measurement of economic performance *ex post*, i.e. with the comparison of the observed ARR for a year, or the average for a number of years, with the IRR. The latter is defined as that rate of discount which will give a zero initial Net Present Value of the lifetime cash flows of a project or (in the case of the whole firm) a group of projects. The calculation of an *ex post* IRR for comparison with an ARR calculated from financial reports has a serious practical drawback in the case of a continuing firm: IRR requires estimates of all future cash flows, which will be extremely subjective in a world of uncertainty. It is this practical obstacle to calculating IRR or any other measure of economic income (explored comprehensively by Kaldor [1955], pp. 62–64), which makes ARR, despite its possible deficiencies, a popular practical alternative for appraising the *ex post* profitability of companies, e.g. in monopoly investigations. In the literature investigating the relationship between ARR and IRR (e.g. the papers by Harcourt and Solomon) it is customary to make 'golden age' assumptions of complete certainty about the future, so that *ex ante* and *ex post* IRRs are identical (expectations are always fulfilled). It might reasonably be argued that this biases the case against ARR, since we are comparing a practical measure (ARR) with a theoretical ideal which is impractical (IRR under conditions of certainty). It should also be noted that the IRR is not always an ideal measure of economic performance even under conditions of certainty, e.g. the IRR assumption of constant discount rate throughout the lifetime of the investment may be inappropriate when interest rates change through time, and maximising a rate of return, such as IRR, is identically equivalent to maximising the absolute amount of profit only when the amount of capital investment is assumed to be fixed. However, in the subsequent argument, we shall accept the framework which is conventional in the current literature and compare ARR with an unambiguous IRR, calculated under conditions of certainty, which is assumed to be an ideal measure of economic performance.

The purpose of this paper is not to deny the justification for scepticism about some uses of ARR but to define those uses in which the deficiencies of ARR are relatively unimportant and

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[1] Sometimes referred to as the Book Yield.

[2] A comprehensive survey of the possible mis-use of book yields (in practice, such as monopoly policy, as well as in empirical research) was provided by R. C. Morris [1971].

to identify the specific sources of deficiencies in ARR, so that they can be corrected or allowed for in uses in which they are potentially important. Section II is devoted to the first task, of suggesting uses in which ARR, with all its deficiencies, may be of some relevance. Although this section is couched in terms of using ARR as a proxy for IRR, it is, in fact, a general statement about the use of proxy variables, which may be of some use in other accounting applications. Section III concentrates on the second task of identifying the sources of its deficiencies, particularly in circumstances in which ARR is used as a proxy for IRR. Both of these tasks are important, because the ARR is widely available in published financial statements and it is therefore widely used. Although the user of ARR in Harcourt's words 'does so at his own peril', it seems likely that the absence of better information will force him to continue to use ARR, and it is better to define the nature of the peril and draw up safety rules, rather than to forbid the use of ARR.

Circumstances in which Accounting Rate of Return may be a satisfactory measure

The most obvious type of situation in which the use of Accounting Rate of Return is legitimate is the tautological one in which the relevant variable *is* ARR rather than IRR or some other variable which has ideal theoretical properties. Although the possibility of such a situation is obvious, it may be less obvious that it is likely to occur very often. In reality, because, as emphasised above, ARR is so readily available, whereas information with more desirable theoretical properties is not, ARR (or its components, accounting profit and book value of assets) may often be the relevant variable in explaining how people actually behave. If the object of an empirical study is positive (i.e. explaining actual behaviour) rather than normative (i.e. defining optimal behaviour) ARR may be superior to IRR or other measures merely because, in a world of uncertainty and imperfect information, it is the rule of thumb to which decision-makers cling.

A good example of the use of ARR in this way is by Myron J. Gordon in his well-known share valuation model (M. J. Gordon [1962]), in which the ARR is used as a variable which explains share valuation, on the grounds that investors will use it in their projection of future earnings and dividends. Another example is its use by Singh [1971 and 1975] to explain the incidence of take overs: it is a plausible hypothesis to suggest that companies with low ARRs have a relatively high probability of being taken over, because their management is perceived as being inefficient (albeit on the basis of a fallible rule of thumb) by shareholders and bidders. The ARR is the relevant variable to use in testing this hypothesis.[3] An application in the broader area of the economics of the firm, which is quite common (e.g. Lewellen [1968] and Lewellen and Huntsman [1970] using US data, and Cosh [1975] and Meeks and Whittington [1975] using UK data) is as a factor determining the pay of top managers. Many other applications can be found.

A related application in which ARR is used as an explanatory variable is in the area of forecasting. If forecasting is done on the basis of a properly specified behavioural model which makes use of ARR, this is merely an extension into the future of the type of positive model described in the previous paragraph. Examples of such work are Weaver and Hall's [1971] model for predicting share prices (in which the use of ARR is suggested, but not tested), and Jones, Tweedie and Whittington's [1976] model for selecting high-yielding shares. In the case of naive forecasting, the sole justification for including any explanatory variable, such as ARR, is that it has predictive power, and it is not necessary to specify the detailed underlying causal relationships. An example of such an exercise (which does not make use of ARR, although it might well have done so) is Coen, Gomme and Kendall (1969).[4]

In addition to the cases in which ARR is the variable which the model requires, there may also be circumstances in which ARR is a suitable proxy for IRR. There are three main sets of extenuating circumstances which can eliminate, or at least reduce, the errors arising from using ARR as a proxy for IRR:

(1) *Unsystematic Error*

If we wish to use ARR as a substitute for IRR, or some other index of economic effectiveness, deviations between ARR and the true measure are misleading only if they lead to a systematic bias. For example, if we are concerned with the influence of firm size on profitability, we would probably wish ideally to regress IRR on a size measure. In practice, IRR is not available, so we may wish to use ARR as a proxy.[5] In such a case, the substitution of ARR will be misleading only if the difference between ARR and IRR is systematically correlated with the explanatory variable. For example, if the effect of accounting practices is such that ARR typically exceeds IRR for firms above a certain size and this excess tends to increase consistently with firm size, the apparent relative profitability (measured as ARR) of large firms will be overstated, and the regression coefficient of Profitability on Size will be biased upwards by the substitution of ARR for IRR. If, on the other hand, the difference between ARR and IRR is uncorrelated with size, the regression coefficient will be unbiased, although random variations between ARR and IRR may add to the degree of stochastic 'noise' in the estimation process, reducing the degree of statistical accuracy of the estimates.[6]

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[3] It does not, however, follow that normative inferences can necessarily be derived from the results, e.g. we can say that the hypothesis does not hold (as is, in fact, the case), using ARR, but we cannot necessarily infer that this implies that 'inefficient' companies do not suffer a high incidence of takeover. The latter statement depends on the extent to which ARR reflects IRR or some other 'economic' measure.

[4] This should not be taken to imply that naive forecasting is itself a particularly satisfactory procedure: there must always be some scepticism as to the future stability of a relationship which has no clear theoretical justification. See, for example, the critical discussion at the end of the paper by Coen, Gomme and Kendall.

More formally, we may state the argument, in terms of the above example, as follows:

We assume that ARR and IRR are linearly related, with a stochastic disturbance term:

$$A_i = c + d.I_i + \mu_i \qquad (1)$$

where

A is ARR

I is IRR

μ is a stochastic error term with zero mean, and cov $(\mu_i I_i) = 0$

i refers to the i^{th} firm

c, d are parameters

We wish to estimate the relationship between IRR and Size, which is of the form:

$$I_i = \alpha + \beta.S_i + \epsilon_i \qquad (2)$$

where

S is Size

ϵ_i is a stochastic error term with zero mean, and cov $\epsilon_i S_i = 0$

α, β are parameters

If we instead use ARR as an observable proxy for IRR, we have:

$$A_i = a + b.S_i + e_i \qquad (3)$$

which, substituting (1) above, is equivalent to:

$$(c + d.I_i + \mu_i) = a + b.S_i + e_i \qquad (4)$$

If we make the following assumptions:

(i) cov $(e_i S_i) = 0$

(ii) cov $(\mu_i S_i) = 0$

(iii) $c = 0$

(iv) $d = 1$

(4) now becomes:

$$I_i = a + b.S_i + (e_i - \mu_i) \qquad (5)$$

Now b is an unbiased estimator of β and a of α, since the error term is a random variable (the sum of two random variables) and is independent of S_i.[7] Obviously, (5) may have a higher residual variance than if we were able directly to test the fundamental relationship (2) (i.e. it is possible that Var $(e_i - \mu_i) >$ Var ϵ_i) but this does not bias the resulting parameter estimate, although it does prevent us from putting a precise confidence interval about the estimate unless we can somehow deduce the properties of μ_i.[8]

It is important to emphasise the fact that random errors need not bias results. Many accountants resort instinctively to arguments of an anecdotal nature, referring to individual observations (... a firm I know of valued its stock in such and such a fashion ... how would that affect your statistical analysis?). Such arguments need be taken seriously only if they indicate a systematic bias in the relationships being examined: otherwise they are merely partial explanations of why we need an error term, i.e. why the observed relationship between the dependent variable and the explanatory variables is not exact.

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[5] This has been done by a number of investigations such as Steckler [1963] in the USA and Samuels and Smythe [1965] and Singh and Whittington [1968] in the UK.

[6] In fact, it is possible to think of plausible reasons why the error introduced by using ARR should be correlated with Size, particularly as Size will often be the denominator of ARR, but this is outside the scope of the present paper. The problem would be avoided if Size were measured in terms of Sales, or some other variable not contained in ARR. The regression of Profitability on Size is only one of many possible applications in which ARR may be used as a proxy for IRR. It is chosen here as an illustration because of its simplicity and its popularity in empirical research.
There is, in addition, the familiar 'errors in variables' problem if the measurement of Size is subject to error. For the purposes of this section of the paper, it is assumed that Size (or whatever other explanatory variable is used) is not subject to error.

[7] Assuming that S_i is not itself subject to error. If this assumption does not hold b will be biased downwards.

[8] The simplest assumption is $\mu_i = 0$ for all i: this is a convenient assumption, since $(e_i - \mu_i)$ now becomes e_i. Note that $\mu_i \neq 0$ does not necessarily mean that the variance of the true residual, $(e_i - \mu_i)$ in (5), is greater than the variance of the observed residual, e_i in (3), as cov $(e_i \mu_i)$ is not necessarily $\leqslant$zero.

(2) *ARR as a Comparative Measure*

It is apparent from the above discussion of the relationship between profitability and size that, for some purposes, we do not require that ARR be equal to IRR even on average. For example, if we are comparing Profitability and Size across firms, provided that *deviations* of ARR *from its average* are equal to deviations of IRR from its average, ARR will be a perfect surrogate for IRR in a cross-sectional comparison.[9] If there are random divergences between the two sets of deviations from average (as described above) the use of ARR as a surrogate will still yield an unbiased estimate of the effects of Size on IRR, provided that there is, on average, a one-for-one correspondence between the two sets of deviations.[10]

More formally, this can be stated, in terms of our earlier example, as follows. If we are interested only in the coefficient β, then the estimate of this in (5) is unaffected even if $c \neq 0$, i.e. if there is a non-zero constant term in the relationship between ARR and IRR. The effect of such a constant term is merely to bias the constant term in (5) as an estimate of α. We now have:

$$I_i = (a - c) + b.S_i + (e_i - \mu_i) \qquad (6)$$

Furthermore, for many purposes, we do not even require a one-for-one correspondence: this is necessary for the use of ARR to give an estimate in terms of *units* of IRR, but we may be interested only in the *direction* of the effect. In the latter case, it is sufficient that ARR is correlated with IRR (provided, of course, that the residual is independent of the explanatory variable used in the analysis). For example, in terms of our Profitability-Size example, we may wish to know whether 'true' profitability (IRR) increases with Size but we may not be interested in the exact extent of the relationship (i.e. the percentage points increase in IRR for a £1 million increase in the Size measure). In such a case ARR is an adequate substitute for IRR for the purpose in hand provided (a) that it is correlated with IRR,[11] and (b) that the variance of ARR which is unexplained by IRR is uncorrelated with the explanatory variable used in the analysis (in our example, Size).

Again, this proposition can be more formally stated, within the framework of our chosen example, as follows. If $d \neq 1$ (in (1)) but also $d \neq 0$, we can still deduce the sign of β (in (2)) from the sign of b (in (3)). Substituting our new assumption about the value of y, equation (6) now becomes:

$$I_i = \frac{(a - c)}{d} + \frac{b}{d}.S_i + \frac{(e_i - \mu_i)}{d} \qquad (7)$$

b is still an unbiased estimator of β. Unfortunately, we are unlikely to know the precise value of d, which would enable us to derive b, but we may be able to make an assumption as to the sign of d. In this case, we can deduce the sign of b, but not its precise value, e.g. if $d > 0$ and $b/d > 0$, then $b > 0$.

(3) *Adjustments to Remove the Effect of Errors in Accounting Data*

There are certain situations in which accounting data are subject to obvious biases. One example is where one company takes over another company of comparable size: in such a situation the subsequent accounting rate of return will be affected crucially by the accounting practices employed to describe the take over, e.g. whether a 'purchase' or 'pooling' approach is adopted to the acquired firm.[12] When such events can be detected, the empirical research worker can attempt to deal with them by appropriate adjustments to the ARR data.[13] If such adjustments are not possible, it may be appropriate to apply the draconian measure of omitting entirely those observations which are affected by mergers and take overs, provided that this does not lead to an important bias in the sample selection process.

An alternative method of adjustment is possible when the sources of bias in ARR are known. In such a case, the sources of bias can be explicitly included in the analysis, so that the variations in ARR which they cause can be attributed to them rather than to the other explanatory variables. For example, growth of assets is a well-known potential source of bias in ARR. In a period of inflation, the higher the recent rate of growth, the higher the relative valuation in the denominator of ARR and the higher the relative valuation upon which the depreciation charge is based, in calculating the numerator.[14] These two biases reinforce one another, one decreasing the numerator (profit) and the other increasing the denominator (capital employed). Thus, other things being equal, rapidly growing companies will tend to have a lower ARR because of the measurement problem, not because their IRR is relatively low. By introducing recent growth as an explanatory variable, we might hope to attribute at least some of this effect[15] to its true source. An example of this is Whittington [1972], a cross-sectional analysis which attempts to relate future profitability (measured as ARR) to various sources of finance. Past growth and past profitability (ARR) are also included as explanatory variables, partly because of their possible influence on the measurement of future profitability in terms of ARR as well as because of their possible causal influence on true profitability (IRR). Obviously, in such an analysis, it is impossible to estimate the extent to which the apparent influence of past ARR and growth is due to real causal factors, rather than measurement bias, but at least it can be hoped that they capture most of the measurement bias, leaving the estimates of the influence of different sources relatively free of such bias.

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[9] The same would be true of a time-series comparison, although serial correlation of errors may be a serious problem in such a case.

[10] This is a consequence of the fact that a regression coefficient measures the relationship between deviations from the individual averages of a pair of variables.

[11] As shown later the correlation may be positive or negative, although, in the latter case, we must reverse the sign of the coefficient estimated using ARR, to assess the effect on IRR.

[12] For an excellent critique of US practice in this respect, see Reinhardt [1972], pp. 9-15.

[13] An interesting example is Meeks [1977], a study of post-merger performance, in which post-merger ARR is related to an estimate of the pre-merger ARR which is a weighted average of the ARRs of the parties to the merger.

Deficiencies of ARR as a proxy for IRR

In this section we are concerned with the known sources of discrepancy between ARR and IRR, i.e. with the factors determining the parameters of equation (1).

The two pioneering papers, by Harcourt [1965] and Solomon [1966],[16] calculated the divergences between ARR and IRR both for individual projects and for balanced stocks of projects on alternative assumptions about depreciation policy, asset life, and growth of asset stock. In addition, Harcourt investigated alternative quasi-rent patterns to the 'one-hoss shay' rectangular pattern, and Solomon investigated the effect of price level changes. They found important discrepancies between ARR and IRR due to the fact that the accountant's measure of depreciation does not necessarily follow the pattern of economic depreciation implied by IRR (valuing the asset as the net present value of its future receipts, discounted at the IRR). They both concluded that ARR is not an accurate measure of IRR and, furthermore, failed to find a systematic pattern in the discrepancy which might have allowed a correction to be made.

From the point of view of empirical work of a statistical nature, the conclusions of Solomon and Harcourt are not as depressing as their authors found them. Their discovery of an arbitrary and apparently unsystematic discrepancy between ARR and IRR explains the need for an error term in equation (1). We would prefer this term to be as small as possible, but it need not bias our estimates of the coefficients. These authors were, of course, worried about the use of ARR as a proxy for IRR in a wide range of applications such as the regulation of public utility prices (Solomon) or the comparison of the performance of a particular industry over specific periods of time (Harcourt): in such cases, it might not be sufficient to be right 'on average'.

Later work by Livingstone and Salamon [1970], Solomon [1971], Stauffer [1971], Bhaskar [1972] and Gordon [1974] extended the earlier work, but the only important generalisation was that the IRR and ARR are equal for a firm in steady state growth at a rate g which equals the IRR (a 'golden rule' situation).[17] However, Gordon (analytically) and Bhaskar (by deterministic simulation) show that the discrepancies between ARR and IRR are minimised if the accountant chooses a depreciation method which approximates the economic depreciation implicit in IRR.

The paper by Bhaskar also contains an interesting probabilistic simulation exercise, in which alternative sets of data are generated from a common basic model (a small firm with a balanced stock of 'one-hoss shay' assets) by making the quasi-rents and asset lives vary in a stochastic manner. A cross-sectional regression of the same form as equation (1) was estimated across the resulting data, and it was found that the constant term was always negative ($c < 0$) and the slope coefficient (d) greater than unity. In terms of the earlier analysis, this would imply that, in using ARR as a surrogate for IRR in empirical work, we can deduce the direction of the influence of the explanatory variable on IRR but not its extent. However, this result may be sensitive to the assumptions of the common underlying model, such as no growth and a constant expected value of quasi-rents.

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[14] Reducing-balance depreciation can create a similar bias even in the absence of inflation.

[15] This statement is put in a relatively weak form because we need to know the precise functional form which the bias takes in order to eliminate it completely: the bias is not necessarily a simple linear function of growth measured over an arbitrarily chosen period. Furthermore, when growth is itself measured in terms of assets or profits reported in company accounts, it may be subject to some of the same measurement errors as ARR.

[16] Solomon published some of his results in 1961 as testimony to the Federal Power Commission. See Solomon [1971].

[17] Another result of this work was to reveal that ARR should be measured net of depreciation in order to approximate IRR best.

A recent paper by Kay [1976] has provided a much more general analysis of the relationship between ARR[18] and IRR. By dealing with continuous time, rather than discrete time, Kay is able to use more powerful analytical techniques, and obtains a number of useful generalisations:[19]

(i) If ARR on a project is constant over the project's life, it is equal to IRR.

Apart from the consequence for empirical work that stability of ARR over time suggests that it is a reasonably good proxy for IRR, this has a particularly interesting implication for government regulation of prices: when government regulation is based on the achievement of a constant ARR, this will also lead to the achievement of an IRR identical with that ARR.

(ii) Every sequence of ARRs defines a valuation function under which the present value of the cash flows of the project is zero.

In other words, if the cash flows of a project (both inflows and outflows) are discounted back to its starting point, using the ARR obtaining in each period as the discount rate for that period, the same result would be obtained by discounting at the constant IRR throughout the life of the project. The case of constant ARR ((i) above) is a special case of this general relationship. Where ARR is not constant, the problem becomes one of finding an appropriate averaging device which will yield IRR, or a close approximation to it. It transpires that the simple unweighted average ARR of a project is not a good device for this purpose. Intuition would suggest that this is because a simple average gives the same weight to later ARRs (which occur further in the future and are therefore less valuable) as earlier ARRs (which occur sooner and are therefore more valuable). That this is, in fact, the deficiency in simple averaging of ARRs is confirmed by Kay's third generalisation:

(iii) If the value of capital employed is discounted at IRR, the weighted average ARR is equal to IRR.

In other words, periodic ARRs are averaged, using as weights the average book values of assets employed for the appropriate periods, and discounted back to the start of the project at IRR. Since IRR in these circumstances is equal to the resulting weighted average ARR, Kay is able to propose a method of adjusting a series of observed ARRs and book values to yield IRR. In the example which he chooses, that of an aggregate of continuing companies (in fact, all of the larger companies in UK manufacturing industry), he has to accept the accountant's book values of initial and terminal values as being equivalent to the economist's values (present values of future flows, discounted at IRR), and this is a general restriction of the usefulness of his method in empirical studies of continuing companies.[20] Obviously, in estimating the IRR of an individual project, with limited life, from observed lifetime accounting data, the Kay method does not suffer from this restriction and is very powerful, as it does not depend upon any particular depreciation scheme being used by the accountant.

Further analysis of the Kay adjustment reveals that it is not likely to be of much importance when there is no time trend in ARR. When ARR declines with time, a simple average ARR will be below IRR, and, conversely, when ARR rises through time, its simple average will be above IRR. This follows intuitively from the fact that the adjustment is essentially a weighting process, the weighting declining with time: e.g. if ARR does not vary systematically through time, the weighted average is not likely to differ greatly from a simple average. The latter result is of importance for empirical work which studies whole firms which are aggregations of different projects and which are therefore likely to exhibit more stable rates of return than individual projects. One special case of aggregation, which had been explored by earlier writers, is steady-state growth, for which Kay derives his next generalisation:

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[18] Measured net of depreciation.

[19] Not all of these claim to be original, some having been derived by earlier writers, such as Vatter [1966].

[20] It might be argued that Current Cost Accounting could improve the applicability of his methods, since CCA balance sheet values might be better surrogates for economic value than are the historic cost values used at present.

(iv) For a firm in steady-state growth at rate n, the ARR is constant and the book value of capital grows at n.

For a continuing firm, constancy of ARR does not (as for a finite project) necessarily imply that ARR = IRR, unless the accountant's initial and terminal values for the observed period coincide with those of the economist. However, on the 'golden rule' path, where n = IRR, we have the situation described earlier, in which ARR = IRR, because the growth of the discrepancy between the accountant's book value and economic value (which takes place at rate n) is exactly offset by the effect of discounting (at IRR = n). The general steady-state relationship between the ARR (a), IRR (r), growth rate (n), economist's value of the firm (W) and book value (V) is contained in Kay's fifth generalisation:

(v) For a firm in steady-state growth relationship $(n - a)/(n - r) = W/V$ holds.

On the plausible (but not inevitable) assumption that $r \geqslant n$ (IRR exceeds growth rate) and that $W \geqslant V$ (the accountant values assets at less than the economist's value, because of the doctrine of conservatism), then $a \geqslant r$, i.e. the ARR will be greater than IRR. The nearer are the two sets of values (W and V) then the nearer are the two rate of return measures.

Kay goes on to derive propositions about management policies based upon accountants' profit measures. These are interesting but do not have an immediate bearing on the matter in hand: the use of ARR as a proxy for IRR in empirical studies. For our present purposes, it is sufficient to summarise Kay's results as follows:

(1) There is a general analytical relationship between ARR and IRR. IRR can be derived as an appropriately weighted average of ARRs.

(2) For an individual project, this weighted average may be calculated exactly, but for a continuing firm, errors may remain because of the discrepancy between accounting and economic values of assets at the beginning and the end of the period.

(3) If a simple unweighted average of a project's ARR is taken, this will be a good proxy for IRR when there is no time trend in ARR, and a perfect one when ARR is constant. When ARR declines through time, the simple average will under-estimate IRR; when ARR rises, the simple average will over-estimate IRR.

(4) In the case of a firm in balanced growth, ARR = IRR where the growth rate = ARR (and therefore = IRR). In cases where the rate of growth is less than IRR, it is reasonable to assume that ARR $\geqslant$ IRR, because of the accountant's conservative tendency to undervalue assets.

(5) We might reasonably expect that for a firm as opposed to a project, the process of aggregating a number of projects of different ages, length of life, etc., would lead to relative stability of ARR and thus to relatively small divergences between average ARR and IRR. We might also expect that the process of averaging over a longer period of years will diminish the effect of the discrepancies between the economist's and the accountant's valuations of opening and closing assets. Unless these discrepancies grow proportionately with time, their importance will be reduced because they will be quantitatively smaller relative to the flows, as the period for measuring the flows increases.

Conclusion

We have argued (in Section II) that there are circumstances in which ARR might actually be preferable to IRR in empirical research, because of its ability to explain actual behaviour. It was also argued that, in cases in which IRR is the ideal variable which is required, ARR can serve as an unbiased proxy, provided that certain statistical independence conditions are fulfilled. Furthermore, it was argued that, in the latter context, statistical biases might be eliminated by appropriate construction of the model or adjustments to the data.

We next (in Section III) surveyed the considerable literature on the relationship between ARR and IRR. It is clear that there can be considerable divergences between the two measures and that any correspondence between them in practice is likely to be a statistical average relationship rather than an exact one. However, it is also clear that the two measures do have an analytical relationship to one another and that, in certain circumstances, there can be an exact correspondence. In empirical work, we shall have more confidence in using ARR as a proxy for IRR when we have a large number of observations (to minimise the effects of random variations), a long observation period for measuring ARR (to average out the inevitable arbitrary year-to-year fluctuations resulting from accounting measurement), a large aggregate of projects (such as a whole firm) over which ARR is measured (to average out the peculiarities of individual projects), no obvious trend in ARR, and similar rates of growth. We should beware of making comparisons across small numbers of observations (such as comparing a pair of companies), measuring ARR for short periods (such as a single year) or single projects, or across firms with widely divergent rates of growth, and should avoid using unweighted average ARR when there is a clear time trend in the ratio. We should also beware of comparisons across companies with characteristics such as vastly different rates of growth, or belonging to different industries (with assets of different length of life, etc.) which are likely to lead to different degrees of discrepancy between the accountant's book value of assets and economic value.[21] However, we should also be aware that such factors will not necessarily invalidate an empirical study, if the discrepancies between IRR and ARR are not correlated with the explanatory variables used in the study.

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[21] In this context it should be remembered that the valuation of stocks and work-in-progress is potentially an important source of such discrepancies: the existing literature tends to concentrate on the problems raised by the accounting valuation of fixed assets.

Oldcastle, Peele and Mellis: a Case of Plagiarism in the Sixteenth Century

B. S. Yamey

Supposed use by Oldcastle of an Italian manuscript

The first published exposition of double-entry bookkeeping was Luca Pacioli's *Summa di arithmetica*... of 1494, a compendium which includes a *tractatus* on the subject under the heading 'Particularis de computis et scripturis'. During the last 100 years the question has been debated whether Pacioli had taken this *tractatus* (or most of it) without acknowledgement from a Venetian manuscript. Fabio Besta was the leading and influential proponent of the charge of plagiarism. Balduin Penndorf and Federigo Melis were the principal proponents of the rival contention that Pacioli himself should be considered the author of the *tractatus*.

It is not intended here to review the debate in all its aspects. Instead, the purpose of this paper is to demonstrate that no reliance can be placed on one major piece of evidence given prominence by Besta.

The first book in English on double-entry bookkeeping was published in 1543—Hugh Oldcastle's *Profitable treatyce*.... No copy of this work is known to have survived. All we know of its contents is gained from another sixteenth-century work, John Mellis's *A briefe instruction*..., 1588. In this preface, signed 'Iohn Mellis Schole-maister', the writer claims that

> I presume ne usurpe not to set forth this worke of mine owne labour and industrie, for truely I am but the renuer and reviver of an auncient old copie printed here in London the 14. of August. 1543

and he says that the original was by 'one Hugh Oldcastle Scholemaster'. Mellis did, however, add an illustrative set of account-books after the text, 'for the better and plainer understanding and practice of these rules'. He also added a short work on arithmetic.

The Mellis text in many places corresponds very closely to Pacioli's text—so much so that Row Fogo, Woolf and Geijsbeek described the former as a translation of the latter.[1] However, there are important differences between the two works. For example, several chapters in Pacioli are not to be found in Mellis; and several passages and sentences in Mellis have no counterpart in Pacioli.

Besta identified and discussed several instances of differences between the two works. His analysis of some of these differences was advanced as a main pillar of support for his conjectures that Pacioli's *tractatus* was in large measure not an original piece of work, and that both Pacioli and Oldcastle had drawn heavily on a Venetian manuscript, of which Oldcastle's version was the more accurate reflection. Besta claimed, in one place, that Oldcastle's text was a translation of the putative Venetian manuscript, and he believed that in turn the Mellis reissue was a 'faithful reproduction' of the Oldcastle text.[2]

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[1] J. Row Fogo, in R. Brown, *A History of Accounting and Accounts*, Edinburgh, 1905, p. 126; A. H. Woolf, *A Short History of Accountants and Accountancy*, London, 1912, p. 131; J. B. Geijsbeek, *Ancient Double-Entry Bookkeeping*, 1914, reprint Houston, 1974, p. 13.

In places Oldcastle seems to have mistranslated individual words used in his Italian source. For example, the word 'monte' used in Pacioli is rendered literally in Mellis, chapter 5, as 'mountaine', whereas it was used here in the sense of an aggregation or totality. In chapter 15, the word 'casa' is rendered as 'chest' (i.e. cash), instead of as 'house' or 'firm'. The word 'cassa' was confused with 'casa'.

[2] F. Besta, *La Ragioneria*, 2nd ed., Milan, 1929, vol. 3, pp. 369–76. Elsewhere Besta wrote that probably the *coup de grâce* to Pacioli's reputation as an author on bookkeeping was given by the evidence of Oldcastle's book, which clearly was a translation not of Pacioli's work but of an earlier manuscript: *Rivista dei Ragionieri*, vol. 9, no. 4; quoted in A. Ceccherelli, *I Libri di Mercatura della Banca Medici, e l'Applicazione della Partita Doppia a Firenze nel Secolo Decimoquarto*, Florence, 1913, p. 8.

The Dutch historian, P. Kats, was the first to point out that several of the additional passages in the Mellis text were virtually identical to passages in the works of James Peele: the *Maner and fourme*... of 1553 and the *Pathe waye to perfectnes*... of 1569. Kats was inclined to subscribe to Besta's general conjecture about Pacioli's lack of originality; nevertheless he was doubtful whether the Mellis text could give it any support. In an article written in Dutch, Kats noted that Besta could not have known that Mellis had taken from Peele a number of passages where Mellis differs from Pacioli,[3] and therefore that these passages could be attributed neither to Oldcastle nor to the Venetian manuscript (and, by implication, that other changes to the Oldcastle original may have been made by Mellis). He noted that Besta evidently was not familiar with the contents of Peele's books, although he did refer to them.[4]

However, Kats's observations on the correspondences between Mellis and Peele seem to have had no impact on the Pacioli debate. They were not noted by either Penndorf or Melis, or by later writers (including myself).[5] Perhaps they have been overlooked because Kats made the main point most clearly in a footnote to an article in Dutch. But even in that article he did not *demonstrate* that the borrowings must have been by Mellis from Peele, rather than by Peele from Oldcastle. Perhaps, also, the point made by Kats has been neglected because Kats was much more guarded in a more readily accessible article. In this article he said that where Oldcastle (= Mellis) and Peele 'agree but differ from Pacioli, it is uncertain which of the English authors had borrowed from the other'.[6] There is no assertion here that Mellis was the plagiarist.

In this paper I examine more closely four instances of correspondence between Mellis and Peele, after I have sketched in the general background. In the penultimate section I also refer to another feature of the Mellis book which helps to establish the dependence of Mellis on Peele.

Peele and Mellis as borrowers

Mellis tells his readers that he added the illustrative set of account-books to the text taken from Oldcastle. It is clear that in this part of the work Mellis took heavily from earlier authors, including Peele. Indeed, Kats came to the conclusion that Mellis's illustrative material was 'manifestly under the direct influence of Peele'.[7] Mellis also borrowed from John Weddington, whose *A breffe instruction*... was published in Antwerp in 1567. Thus the entry in the inventory for 'lands and rents' is very similar in the two books: in Weddington the asset is a farm purchased from 'one Maister Iohan Hayes gentilman to me and my eyres for ever, after the rate of 16 yeres pourchase, wher unto ther is belonginge 50 ackers of lande'; the sequence is the same in Mellis, except that the previous owner is 'one M. Iohn H. Gentleman'. The closing entry in the ledger account for this asset records the profit; it appears in both cases rather oddly as (in modern spelling) 'net rest and balance of this account'. Again, a writing-down in the account of household goods is in both cases (in modern spelling) 'for so much as I do find at this day to be wholly consumed and worn' (with Mellis omitting 'wholly').

Peele also borrowed from some of his predecessors; and like his contemporaries he did not acknowledge the sources of his borrowings. But, unlike Mellis, Peele never borrowed slavishly. He altered, adapted or embellished the ideas or expressions he appears to have taken from others. All the cases of apparent borrowing by Peele—the Mellis–Peele correspondences are considered more fully below—are such as to suggest, in the words of Kats, that 'Peele was someone who scorned the use of words other than his own'.[8] A few examples should make this clear.

First, in the *Maner and fourme* Peele seems to have followed a pedagogic device introduced by

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[3] P. Kats, 'De Invloed der Nederlanders der 16de en 17de Eeuw op de Engelsche Literatuur van het Boekhouden', *Maandblad voor het Boekhouden*, vol. 32, 1925–26, p. 176, n. 5.

[4] Besta, *op. cit.*, p. 394.

[5] See B. Penndorf, *Luca Pacioli: Abhandlung über die Buchhaltung 1494*, Stuttgart, 1933, pp. 63–8; F. Melis, *Storia della Ragioneria*, Bologna, 1950, pp. 620–23; C. Antinori, *Luca Pacioli: Summa di Arithmetica*..., Milan, 1959, pp. 7–10; T. Antoni, *Fabio Besta*, Pisa, 1970, pp. 86–7; B. S. Yamey, H. C. Edey and H. W. Thomson, *Accounting in England and Scotland: 1543–1800*, London, 1963, pp. 155–9; B. S. Yamey, 'Fifteenth and Sixteenth Century Manuscripts on the Art of Bookkeeping', *Journal of Accounting Research*, vol. 5, 1967, pp. 64–68 (reprinted in *Essays on the History of Accounting*, New York, 1978).

[6] P. Kats, 'Hugh Oldcastle and John Mellis', *Accountant*, 27 March 1926, p. 483. However, in an article published in the following year Kats wrote as follows '... it is certain that Mellis altered it [the Oldcastle book] by taking passages from Peele...'. P. Kats, 'The "Nouvelle Instruction" of Jehan Ympyn Christophle', *Accountant*, 20 August 1927, p. 262.

[7] Kats, 'De Invloed...', p. 172.

[8] *Ibid.*, p. 176, n. 5. It may be noted that Mellis took as the title of his book the first 25 words of Weddington's title, with one word omitted and one ampersand added unnecessarily. The title of Peele's first book has in it one element of the title of the English version of Ympyn's book (1547), and a hint of part of Oldcastle's title.

Manzoni in his *Quaderno doppio* of 1540. Manzoni numbered consecutively the entries in his illustrative journal (a procedure also to be found in contemporary practice[9]). In the text there is a table ('tavola') listing the various types of transaction, in each case with a reference to the numbered journal entry which exemplifies the type of transaction and another to the folios of the ledger accounts involved. Each entry in the journal also has a description of the type of transaction in the margin. Peele seems to have adopted Manzoni's method; but he improved upon it in that he replaced the table with a long section in which the treatment of each type of transaction is set out (i.e., the accounts to be debited and credited) with appropriate references to the numbered entries in the journal.

Second, in the *Nieuwe instructie* of 1543, Ympyn introduced several unusual features in the procedures for closing a ledger. One of these was to bring together all the remaining balances on the various goods accounts in a single collective account. Its balance was transferred to the final balance account. The collective account was reopened in the new ledger, and from it the individual goods accounts. Peele referred to this practice in his first book, but did not follow it in his model set of accounts. In the *Pathe waye*, however, Peele described as well as illustrated this treatment. Again he improved on his model. Instead of re-opening the collective goods account in the new ledger, Peele opens the individual goods accounts in the new ledger directly from the collective account in the old ledger—using for this purpose an additional posting column in the latter account, following in this respect Ympyn's practice in his balance account.

Third, Pacioli did not include money values in his inventory book or record, partly because others besides the owner of the business could write in it or have access to it, unlike the journal which was 'your secret book'. Ympyn was the first to show an inventory with money values for each item. But the assets and liabilities are not aggregated in any way. In the *Maner and fourme* Peele also has money values. In addition, however, the assets are totalled; also the liabilities; and finally the net balance, the 'substaunce of the owner', is shown.

Occasionally in Peele's works one imagines one detects echoes of Pacioli's *tractatus*. Generally these refer to minor matters on which there was little scope for originality of exposition or expression. But on more interesting matters closer examination shows once again traces of Peele's originality, even when he might have been inspired by Pacioli either directly or else through Oldcastle. Here are two instances. First, in his opening chapter Pacioli explains that a merchant needs three things, of which the 'first and principall is money or other substance', to quote Oldcastle–Mellis. But Pacioli goes on to explain that some successful merchants in Italy had begun their trading careers without capital, and relied initially on the credit which others were prepared to extend to them. In Peele's *Maner and fourme* the same idea recurs, but in a different context. In the chapter on the opening inventory it is explained that 'he that hath no gooddes (but suche as at his beginnying, he taketh on credite) nedeth no Inventorie'. Second, in Pacioli's 15th chapter the point is made that if a merchant were to lose his ledger 'by infortune of thieves, fire or water, &c' (to quote Oldcastle–Mellis), he could reconstruct it from the surviving journal. In his first book Peele considers a different aspect of the feature that the journal and the ledger contain the same information, although organised differently in the two books. He advises that in the event of a dispute between the merchant and his account-keeper or factor, the former should take custody of the ledger and the latter be given the journal: 'for these twoo bookes ought alwaies to agree, as indentures'.

In general, Peele's books, and much more notably the *Pathe waye* of 1569, impress by the quality of exposition and the clarity and comprehensiveness of the examples. Peele strikes one as an author who by 1569 had mastered his subject, had absorbed the innovations introduced by several of his predecessors, and had reflected fruitfully on the problems of exposition. The *Maner and fourme* is a good work, but has its flaws. The *Pathe waye* is very much better. One can concur in Kats's judgment: the second book 'is an important advance, not only on Peele's earlier book, but also on every other book which by then had appeared in print'.[10] Kats expressed this view before a copy of Weddington's book of 1567 had become accessible for study. Peele clearly borrowed from Weddington.[11] Nevertheless, after allowing for these borrowings, there is no need to question the high quality of the *Pathe waye* and its superiority over its predecessors.

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[9] See, for example, Besta, *op. cit.*, p. 350, for the 16th century journal of Zuan Antonio Barbarigo.

[10] Kats, 'De Invloed . . .', p. 170.

[11] See B. S. Yamey, 'John Weddington's "A Breffe Instruction", 1567', *Accounting Research*, vol. 9, 1958 (reprinted in *Essays . . .*, 1978).

Mellis, on the other hand, was a heavy borrower—that is evident in that part of his book for which he was directly responsible. There is therefore a very strong presumption that any close correspondences between Mellis and Peele are instances of borrowings by Mellis from Peele rather than of borrowings by Peele from Oldcastle. However, it is possible to go well beyond this presumption. Examination of some of the correspondences makes it clear that Mellis *must* have been the borrower. It is evident, also, that Mellis was inefficient as an editor or adaptor of Oldcastle's treatise.

Some common passages in Peele and Mellis

Scope and Arrangement of the Inventory

Our first example of a correspondence between Mellis and Peele concerns the inventory, and is especially instructive.

Pacioli taught that the merchant's inventory should include all his worldly belongings ('cio che se ritrova haver al mondo de mobile e de stabile'), and should begin with those items most costly and most liable to be mislaid or lost. His example of an inventory (chapter 3) therefore includes both business and personal assets, and begins with money. No money values are attached to items other than cash and debts.

In his first book, the *Maner and fourme*, Peele also includes all the merchant's possessions and liabilities in the inventory. For each item a money value is assigned. The liabilities are shown last (as also in Pacioli), and their total is deducted from the previous sub-total of assets, to yield a final sum: 'and the remain is the substaunce of the owner'. In his later *Pathe waye*, Peele organised his bookkeeping rather differently. Business assets and transactions are segregated from the owner's private concerns. There are therefore two inventories, two journals and two inter-connected ledgers: in this, Peele was almost certainly following a suggestion for the preservation of secrecy made (but not illustrated) by Weddington two years earlier. Peele's first inventory is limited to assets and liabilities in the business, and accordingly is titled 'the inventorie of employementes for trafique in marchaundies'. In the text Peele writes: '... and then subtracte the somme totall of the creditours, from the totall somme of money, debtes & goodes, and the remayne is the net substaunce, stocke, or capitall, by the owner putt in trafique of marchaundise'. A separate inventory, referred to in the text as the 'inventorie generall', comprehends not only this 'saide net rest, or stocke for trafique before spoken of', but also 'divers other thinges', including the owner's 'landes, rentes, anuities, plate, Jewelles, & readie monie, reserved in his owne proper keping'.

We now come to Mellis. In the second chapter Mellis explains that the inventory includes 'all his substance moveables and unmoveables'. In the next chapter a specimen inventory is presented, the order of items being the same as in Pacioli's corresponding chapter. Business and personal assets are both included. Money values are attached to cash and debts and, haphazardly, to a few other items, but not, for example, to the items of merchandise, 'grocerie wares'. The chapter ends as follows:

> Then gather together the whole summe of your ready money, debtes and goods, And therefrom Subtract the totall summe of your Creditours, and the remaine is the net rest, substance or capitall of the owner to be put in a trafique, &c.[12]

It is evident that Mellis, having followed a Paciolian model in the main part of the chapter (probably reproducing Oldcastle here), veered towards the quite different treatments of the inventory in Peele, and tacked on to the original some slightly altered and garbled sentences taken from Peele's *Pathe waye*.[13] What is correct and appropriate in Peele would have been incomprehensible or misleading to readers of Mellis.[14] Such readers would have got little help if they turned to the inventory in the illustrative set of account-books. For the example includes assets employed in 'trafique' as well as personal assets such as plate, lands and rents, dwelling house and household stuff. Moreover, the order of the items does not accord with the order in the text chapter; instead, it follows the order in the example in Peele's *Maner and fourme*. Mellis here calls his inventory the 'inventory general'—a correct use, obviously taken from Peele's second book.

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[12] In chapter 13, Mellis again used a similar form of words. He explains that, presumably after all the entries for the opening inventory have been posted to the ledger, the credit balance on the stock or capital account is 'the net substaunce or Capitall of the owner to bee put in trafique, &c.'. To arrive at this balance to 'make the summes equall, gather the total hereof [debit entries] in a piece of paper aparte, and subtray it from the totall summe of your Creditor opposite, and the rest is the net substaunce ...'. The purpose of the calculation is not clear, but presumably it was intended as a check on the postings to the ledger—since the balance on the stock account should equal the net balance established in the inventory itself. There is no counterpart to this passage in Pacioli. Peele in his *Pathe waye* also has a check on the opening entries in the ledger. A trial balance is drawn up, 'in a paper aparte', to see whether the 'state of thaccompte' [i.e. the ledger] is 'perfectlie ballaunced'. An indirect influence of Peele on Mellis appears to be in evidence here.

Mellis's exposition is rather clumsy. The balancing of the capital account is not described clearly. Moreover, it is discussed before the discussion, in the next chapter, of the ledger entries for the items of merchandise in the inventory.

[13] Kats noted merely that Mellis had grafted this feature of Peele's 'rather thoughtlessly' on to the original of 1543. Kats, 'Hugh Oldcastle ...', p. 484.

Rules for Debits and Credits

The second example of a correspondence between Peele and Mellis to be considered here concerns the rule for debits and credits, referred to both by Besta and Kats.

In the *Maner and fourme*, Peele writes:

> Then as touchyng the enterying of your Inventorie, into the Journall, as the order of this accompt requireth, you shall in eche parcell of the said Journall, expresse two denominacions: whereof the first shalbee the name of the Debitour, receivour, or borower, and the other of the Creditour, deliverer, or lender.

One of the precepts presented in a piece of verse preceding the model journal elaborates the point:

> To make the thinges Receivyd, or the receiver, Debter to the thinges delivered, or to the deliverer.

This is the first appearance in the accounting literature of a general rule for determining the accounts to be debited or credited in the recording of a transaction (assuming, that is, that it was not already in the lost Oldcastle). The rule appears again in the *Pathe waye*, early in the instructional dialogue between the schoolmaster and his eager 'scholler'. The schoolmaster says:

> Yt is a certayne rule to be learned by rote, and also by reason, and is to be practised in all causes of entring percelles into the Journall for the moste parte, which being well understanded, is a greate, furtherance to that which is yet to learne, and thus it is. All thinges receaved, or the receaver, must owe to all thinges delivered, or to the deliverer.

At the pupil's request, the schoolmaster explains the 'reason' for the rule. He does this in a longish paragraph, by analysing a few simple transactions.

The sentences and passages in question are to be found also in Mellis's ninth chapter, which in its title, but not in all its contents, corresponds to Pacioli's tenth chapter. The first part deals with the marking of the journal, the numbering of its leaves, the privacy of the book, and the requirement that journal entries should be written 'in shorter sentence, without superfluous words, than be the parcels in ye Inventory or Memorial'. Then follows this passage in Mellis, which is not to be found in Pacioli:

> ...But first it is to be noted, that yee know the two termes used in the saide Journall after the maner as is used in the same, which as the order of this account requireth, is expressed by two denominations: to wit, by Debitor, and Creditor, whereof the first is the name of the Debitor, receiver or borrower; and the other of the Creditor, deliverer, or lender. To the furtherance whereof there is a Rule, which beeing well understood, will aide you greatly: which Rule is to bee learned as well by rote, as by reason, which is thus.
>
> All thinges received, or the receiver must owe to all thinges delivered, or to the deliverer.

As in Peele's *Pathe waye*, the rule is printed in roman type, as distinct from the black-letter type which is otherwise used. After the rule comes a paragraph which is almost identical to Peele's explanation of the rule, the main difference being that different proper names are used.

It is evident that Mellis, when working from Oldcastle's Paciolian text, decided at this point to 'bewtify' the original; and he did so by appropriating and cobbling together a piece from each of Peele's two books.

Pacioli's tenth chapter ends with a reference to 'doi termini' (two terms) used in the Venetian journal. The eleventh chapter explains that these two terms are 'Per' and 'A', to denote respectively the debtor and the creditor involved in each transaction recorded in the journal.[15] Mellis did not use this terminology in his journal entries;[16] and there is no chapter in his book corresponding to Pacioli's eleventh chapter. The first 27 words in the quoted passage, however, are derived from Pacioli or from a Paciolian model. Then the 'two terms' corresponding to Pacioli's 'doi termini' becomes the quite different 'two denominations' of the earlier Peele; and the passage from Peele is rendered less comprehensible by the gratuitous insertion of the words 'to wit, by debitor and creditor'—gratuitous and misleading, since the two terms 'debitor' and 'creditor' do not both appear in journal entries in Venetian practice, in Pacioli, in Peele or indeed in Mellis.[17] At this point, after having inexpertly grafted a bit of the earlier Peele on to the Venetian or Paciolian body, Mellis switched over to the later Peele, and took from it material for a long passage, including a substantial paragraph with virtually no modification.

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[14] It should be noted that Mellis did not use the word 'goods' restrictively in the sense of merchandise only. For example, the preamble to the model inventory (in chapter 3) refers to 'this my present Inventorie of all my goods, moveables, and immoveables, debtes and creditors...'. And the heading of chapter 14, which deals with the entering into the ledger of the opening items of goods to be traded, begins: 'How the parcels of marchandises ought to be entered and written,...'.

[15] On Pacioli's journal entries, see B. S. Yamey, 'Two Typographical Ambiguities in Pacioli's "Summa" and the Difficulties of its Translators', *Gutenberg-Jahrbuch*, 1976, pp. 156–9 (reprinted in *Essays...*, 1978).

Illustrative Account-Book Rulings

The third instance of close correspondence between Peele and Mellis to be considered here is about illustrations of the ruling of account-books.

In Peele's *Pathe waye* the specimen rulings appear early in the dialogue between the schoolmaster and his pupil, who, as apprentice ('covenaunte servaunt') to a merchant ('for smale wages, but in hope of good preferment and creadite, having as yet very little of myne owne'), had some familiarity with counting-house matters. The teacher briefly describes the various account-books to be kept, and explains that the inventory and the memorial 'shall not nede to be ruled'. He then, in effect, shows the pupil specimen rulings. In the book these take up the next three pages, which are introduced by this rubric:

> This page cominge next, declareth howe everye leafe and side in the Journall must be ruled, and the other two sides folowinge, declare howe everie face of accompte in the leager or greate booke (lyinge open) shall be ruled, the one for the debitour side, and the other for the creditour.

The scholar, having said that 'I have perused, & understand you verie well', is then asked to 'utter unto me howe you understand of the same'. He explains the purpose of the various spaces into which the ruled pages are divided. Thus the introduction to the subject, the demonstration and the explanation are developed smoothly and clearly.

In Mellis, the specimen ruled pages come abruptly at the end of the twelfth chapter. There is no introduction to these pages, which in essentials as well as in most of the detail are the same as in Peele. They come after the rulings of both journal and ledger have been described in words (chapters 9 and 11); after specimen entries in the journal have been presented (chapter 10); and after 'the way and manner of bringing the parcels out of the Iournal into the Leager' has been explained (chapter 12). The only novelty in Mellis's specimen pages is the inclusion of a specimen index to the ledger, with four specimen entries in it. This specimen index extends to four pages. It has no heading or introduction. And there are no cross-references in these pages to any of the specimens in the chapters dealing with the rulings of the various account-books or with the index (chapters 11 and 13).

It is evident from their placing and the lack of integration with the rest of the text that the specimen ruled pages were added by Mellis to an existing expository text. And it is also evident that Mellis had taken the new material from Peele.

Besta was interested in the terminology used by Mellis (Oldcastle). In particular, he noted the absence of the terms 'Per' and 'A', or their English equivalents, in the journal entries. And he observed that whereas in Pacioli the two sides of a ledger account were designated by the words 'deve (devono) dare' (must give) and 'deve (devono) avere' (must have), in Oldcastle they were distinguished by the titles 'debitor side' and 'creditor side', respectively. As to the latter, Besta was mistaken. For the headings 'debitor side' and

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[16] Occasionally Mellis seems to have forgotten to remove all traces of the Venetian form of entry; see Mellis, chapters 15, 16 and 23.

[17] The words 'to wit, Debitor and Creditor' appear also in the heading of Mellis's chapter 10: '... and of two other termes used in the Leager: whereof one is named Capsa, and that other Capitall, and what by them is to be understoode, to wit, Debitor and Creditor'. This chapter is close to Pacioli's chapter 12. The relevant part of the chapter-heading is: '... E deli doi altri termini nel quaderno usitati luno detto Cassa, e laltro Cavedale. E quello che per essi se habia intendere'. The Mellis 'capsa' appears to be a misreading of 'cassa' (cash) in the original, whether a manuscript or Pacioli. The last five words in the Mellis heading appear to be an innovation by Mellis, or perhaps by Oldcastle. It is inept. The text of the chapter both in Pacioli and Mellis makes it clear that 'cash' is not to be understood as 'debitor', but as 'the chyst or ready money'. Rather, it is said that the cash account in the ledger should always have a debit balance (or zero balance), and could not be in credit. The explanation of 'capital' is as follows in Mellis: '... and by Capitall is understoode the substance of a mans goodes, or his stocke, which stocke shal alwayes bee Creditor, aswell in your Journall, as in your Ledger...'. One wonders what the reader would have made of this prescription. The corresponding passage in Pacioli also is cryptic.

'creditor side' are not, as he thought, integral parts of an actual ledger opening, but are, instead, no more than descriptive headings to the specimen rulings borrowed by Mellis from Peele.

Nevertheless, Besta's discussion is pertinent to the main theme of this paper. He said that these differences between Pacioli and Oldcastle were modifications made by *Oldcastle* and constituted 'the original part of Oldcastle's work', and that Oldcastle in the frontispiece of his work had referred specifically to the fact that he was introducing some alterations.[18] Again, Besta was mistaken. The only preface in the Mellis book is signed by Mellis himself, and the modifications referred to are clearly those made by Mellis to Oldcastle: '... which rules in divers places, I have bewtified and enlarged according to my simple knowledge'. It is more interesting, however, that Besta should have made the point that Oldcastle had made alterations to the presumed Venetian manuscript which he was supposed to be translating. For once it is recognised that parts of Oldcastle's text may be Oldcastle's own original contributions, the text cannot be relied on in any part as being a translation or faithful rendering of the hypothesised manuscript. Hence no observed *differences* between Pacioli and Oldcastle (Mellis) can support Besta's supposition that both Pacioli and Oldcastle worked from the same presumed manuscript, but that the latter did so more closely than the former. Oddly enough, *correspondences* between Pacioli and Oldcastle provide stronger support for a conjecture of their dependence on a common source; but of course these numerous and pervasive correspondences also support the much more plausible supposition that it was the Pacioli printed text which Oldcastle used as his model.

Partnership Accounts

The fourth instance of a correspondence between Peele and Mellis to be considered here involves Peele's *Maner and fourme.*

Pacioli's 21st chapter deals with the 'partita famosa ditta compagnie', that is, the accounts to be kept for a partnership. Mellis's sixteenth chapter treats of the same subject, under a similar title: 'The manner of the keeping of the famous accompt of companie, how it ought to bee ordered in al the 3 bookes'. Pacioli explains that the partner in question can keep the partnership accounts in his own books, or that a separate set of books can be opened. Mellis also deals with the two alternative methods. Some passages are closely similar in the two works.[19] Pacioli's exposition in this chapter is by no means clear, and neither is Mellis's.

Peele considered partnership or joint-venture accounts in the tenth (misnumbered eleventh) chapter of his *Maner and fourme.* He seems to have done this as an afterthought, in a chapter which refers to the opening of a new journal to replace the one completed. He explains 'howe to charge or discharge your bookes in any accompt, partable for vyages or otherwyse by compacte'. A 'partable' account is opened and debited (credited) for assets disposed of (received) on partnership business. He explains that each partner should have such an account in his own ledger. In addition,

> it is needefull that every partener doo keepe thereof a Jornall and Quaterne, declaryng therby howe thynges have passed or chaunced in tyme of that theyr partable accompt [meaning here, partnership business], wherein they must fyrst make an Inventory, declaryng what eche man dooth put in. Then entre it into theyre Jornall [i.e. the partnership journal], makying eche thyng debitor to theyr partable stocke and bear the parcelles into their great booke of that compact, as you have in this ordre before bene instructed. And then as the reste of your occupyeng in the sayd accompt chaunceth, so ordre your bookes. And at your viages returne or ende of your compactes, ballance up the bookes. And your parte therein as well as that you put in as your gaynes, beare into the Jornall of your principall accompt [i.e. your own journal], be it money wares or debtes, and make it debitor to the partable accompte, as is in the second parcell [in the illustrative journal] bearyng it to your greate booke, whereon the creditour syde of partable accompt you shall fynde your principall answered with a gayne.

This long passage appears as the concluding paragraph in Mellis's chapter, introduced only by the word 'item'. There are some small changes in wording; the wholly unhelpful and confusing omission of 20 words; and the characteristic addition of the symbol '&c' after the concluding word 'gaine'.

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[18] Besta, *op. cit.*, pp. 371–2.

[19] Kats overstated the similarities when he wrote that Mellis here 'compares closely with the Italian tract' of Pacioli: Kats, 'Hugh Oldcastle ...', p. 485.

In one place Oldcastle (or more likely Mellis) misunderstood the original: the assets introduced by the other partners to the joint venture are debited to the 'stocke of the companie'.

As Kats had noted, Mellis refers in his paragraph to the 'second parcel': he slavishly followed Peele, in a manner which must have puzzled his readers, since in the illustrative journal in Mellis the entries are not numbered as they are in Peele; and there is no entry in Mellis's journal involving a partable account. Mellis's borrowing from Peele is evident here in other ways too. Thus it is only in the final paragraph of his partnership chapter that he uses the word 'partable' rather than 'company', or refers to a voyage in connection with partnership.

Further evidence of Peele's influence on Mellis

In two instances chapter-headings in Mellis closely resemble the corresponding headings in Pacioli, and in each case includes a reference to a matter not discussed in the chapter itself.

The first is Mellis's 12th chapter. This chapter deals primarily with the posting of entries from the journal to the ledger. Pacioli, in his fourteenth chapter, instructs how the journal entry is to be cancelled when it is posted: two transverse lines are to be drawn across the narration section of the journal, one for the posting to the debit of a ledger account, and the other for that to the credit of an account. This Venetian practice is not included in Mellis. The heading of the chapter nevertheless contains the words, 'and the maner of striking out the parcels of the Journall' (in Pacioli, 'e del modo a depennare le partite in giornale').

The second example is Mellis's twenty-first chapter, which deals primarily with the calling-over and 'pricking' of the ledger entries against the journal entries, preparatory to the balancing of the books. In his 32nd chapter, Pacioli concludes with the observation that the ledger entries should also be checked against the memorial and any other books kept. Mellis does not have this observation. Nevertheless, as in Pacioli, the chapter-heading includes the following: 'And the manner of examination by pricks, and perusing with the Memoriall, Iournall, and the Leager'.

This is evidence of careless editing. More to the point, it suggests the influence of Peele. For Peele's works discuss neither the cancellation of posted journal entries nor the checking of the ledger against records other than the journal. It is probable that Mellis followed Peele's example in omitting references to these two practices, but failed to alter the Paciolian chapter-headings consequentially. Although these omissions concern minor matters, they serve to provide some further confirmation for the main themes of this paper, namely that Mellis was influenced by Peele when revising the Oldcastle text, and that he was a poor editor or improver.[20]

Conclusion

In all, Mellis took liberally from Peele. The detectable resulting changes made to the Oldcastle text are important. One must suppose that Mellis made other changes as well. The Mellis re-issue of 1588 is therefore not to be treated as an even approximately faithful reproduction of the Oldcastle text. It is ironical, in the light of Besta's views, to suggest that it may well be that the Mellis text is closest to the lost original Oldcastle only in those places where it is closest to the Pacioli text. This is so, because divergencies between Pacioli and Mellis may have a far simpler explanation than that asserted by Besta. They may be changes made by Mellis.

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[20] Occasionally the corresponding chapter-headings in Pacioli and Mellis both announce something which is not done in the chapter. For instance, the headings of Pacioli's chapter 13 and Mellis's chapter 11 both promise to tell the reader how the index to the ledger can be made single or double. The double index is not described in either book.

A Critique of the Richardson Report*

David M. Emanuel

Introduction

In November 1975 the New Zealand Government established a Committee to 'assess the merits of alternative standards and methods [of accounting] that might be adopted in New Zealand...' in the light of rapidly changing price levels. The Report of this Committee (popularly known as the Richardson Report) was presented to the New Zealand Minister of Finance in September 1976 and released to the public in December 1976.[1] The Committee therefore filled the same sort of role in New Zealand as the Sandilands Committee did in the UK.

This note is in four parts. The first two parts consist of a short summary of the principal conclusions of the Richardson Report, together with an example. Then follows a comparison between the method described in the Report and three other methods of accounting for changing prices ('current cost accounting' as pronounced upon by some professional bodies, current purchasing power accounting, and relative price level accounting). The final section is devoted to justification and critique.

I. The recommendations of the Richardson Committee

The Richardson Committee made the following recommendations:

1. Assets that are essential to the business should be valued at current replacement cost, with others being valued at net realisable value. Thus in no circumstances would assets be valued at economic (present) value, or recoverable amount.[2]
2. Depreciation is to be based on *year-end* current cost. Backlog depreciation is to be charged against the asset revaluation reserve, labelled capital maintenance reserve.
3. Cost of sales should be based on current input costs. Enterprises using periodic inventory systems should make the 'cost of sales adjustment' to assist in the approximation of current cost of stock sold.
4. Monetary assets are categorised as fixed or circulating. Given the basic objective of maintenance of operating capacity, increasing prices will result in an increased investment in circulating monetary assets (for example, increased debtors levels, etc.)
5. A distinction is made between current cost operating profit of the enterprise, and profit attributable to the owners. The former is described as an entity concept in that it emphasises the maintenance of the operating capacity of the enterprise's assets. The latter may be described as a proprietorship concept in that it is concerned with the division of the current cost operating profit between various classes of equity holders. Hence interest is not treated as an expense in arriving at current cost operating profit, but as a distribution of part of that profit. It is, however, an expense as far as the residual equity-holders are concerned.
6. In addition, residual equity-holders gain (lose) when part of the entity's resources are financed by borrowings in times of rising (falling) prices. This gain accrues as a result of debt payments being fixed contractually in terms of numbers of dollars. Hence an element of income (as far

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*Special thanks are due to an anonymous referee.

[1] *The Report of the Committee of Inquiry into Inflation Accounting* (New Zealand Government Printer: Wellington, 1976).

[2] The term 'recoverable amount' relates to the portion of an asset's current cost expected to be recovered through charges against revenue, or through sale. See the Institute of Chartered Accountants in Australia and Australian Society of Accountants, *Statement of Provisional Accounting Standards 'Current Cost Accounting'* (October, 1976).

as the shareholders are concerned) is the percentage of the increase in the capital maintenance reserve financed by borrowings.

II. An example

The major extension of the Richardson Committee over most other professional and government committees pronouncing on the subject of price level accounting lay with the explicit consideration of monetary items. In this respect the Committee's recommendations are similar to the German accounting standard 'Accounting for the purpose of maintaining the "substantialistic value" of an enterprise' issued in October 1975 by the Institut der Wirtschaftsprüfer. This being the case, the example presented here is based on those shown in 'Accounting for Price Changes: An Analysis of Current Developments in Germany'.[3]

Opening financial position is given as:

Land	200	Equity	800
Machinery	600	Debt	800
Inventory	400		
Cash	400		
	$1600		$1600

The following assumptions are made:

Land: Increase in current cost—15%.

Machinery: Increase in current cost—10%; depreciation 20% based on book value, with the amount reinvested in additional machinery.

Inventory: Turnover is twice, with replacement costs being $450 and $500. Inventory volume is assumed to remain constant.

Sales: $2600 (cash).

Wages: $1398 (cash).

Interest: 10% on $200 of debt.

Change in general price level: 10%.

Current Cost Income Statement for the accounting period

Sales	2600
Current cost of goods sold	−950
Gross profit	1650
Wages	−1398
Depreciation	−132
Circulating monetary assets[4]	−45
Current cost operating profit of the enterprise	75
Interest on borrowed funds	−20
Increase in capital maintenance reserve financed by borrowings[5]	108
Profit attributable to the owners	$163

Closing financial position is:

Land	230	Opening equity	800
Machinery	660	Capital maintenance reserve	127
Inventory	500	Profit	163
Cash	500	Debt	800
	$1890		$1890

Increases in the capital maintenance reserve arose from the revaluation of land ($30), machinery ($60), inventory ($100), and from the circulating monetary asset adjustment ($45). Part of this increase of $235 is to be treated as profit attributable to the owner, with the calculation based on the ratio of average debt to average assets of the entity.

III. A comparison of the treatment of holding gains under alternative methods of price level accounting

In this section the major differences between the Richardson Committee's recommendations (with regard to holding gains included in income) and various proposed alternatives are illustrated. This will help to put the recommendations into perspective by relating them to what, historically, have become more familiar methods of price level accounting. A transactionless interval is assumed, during which both specific and general prices change. This 'holding interval' is an artificial construct used by Edwards and Bell, Revsine[6] and others to illustrate what is perceived to be the important dichotomy in current cost accounting,

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[3] Adolf G. Coenenberg and Klaus Macharzina, 'Accounting for Price Changes: An Analysis of Current Developments in Germany', *Journal of Business Finance and Accounting*, Spring, 1976, pp. 53–68.

[4] Calculated at 10% on average monetary assets ($450), i.e. $45.

[5] Calculated at (increase in capital maintenance reserve)

$$\times \frac{\text{average borrowings}}{\text{average total assets}} \quad \text{i.e. } \$235 \times \frac{800}{1745} = 108.$$

For the purpose of this exercise, it is assumed that 'borrowings' equate with liabilities.

[6] E. O. Edwards and P. W. Bell, *The Theory and Measurement of Business Income* (The University of California Press, 1961); Lawrence Revsine, *Replacement Cost Accounting* (Prentice-Hall, 1973).

namely the distinction drawn between operating profit and holding gains.

The alternatives are:

1. The method of 'current cost accounting' as recommended by the Sandilands Committee and, at least initially, by some professional accounting bodies.[7] The focus of these methods was to account for the 'current cost' of non-monetary assets only. In the analysis that follows, all holding gains under this method are treated as 'capital adjustments'.
2. The method described as 'current purchasing power accounting'. This method does not purport to be more than a supplement to historical cost accounting, using units of purchasing power as the unit of account. A general or consumer price index is normally used in this exercise. As with historical cost accounting, changes in specific prices are ignored. The holding gain on net monetary liabilities is included in the current purchasing power accounting profit calculation.
3. Relative price level accounting methods, whereby attention is given to both general and specific price changes. Relative price level accounting methods have been enunciated by Edwards and Bell, and Chambers,[8] amongst others. In essence these methods involve valuing assets in terms of their specific (entry or exit) prices, and maintaining equity capital in terms of a consumer or general price-level index.
4. The Richardson Committee's profit attributable to the owner.

The operating profit component of income is essentially the same under Richardson, Sandilands, and relative price level accounting. As can be seen in the illustration, however, the Richardson Committee excludes interest and includes a circulating monetary asset adjustment in the calculation of current cost operating profit. For our purposes, however, interest is treated as an expense (as its accounting treatment is common to all four methods described above), whereas the effect of circulating monetary assets will be shown separately, as this adjustment is unique to the Richardson Report. This effectively means that profit before holding gains will be identical for methods 1, 3, and 4, and enables us to concentrate on the differing effects of holding gains on income.

Current purchasing power accounting (method 2) is included in this analysis as it contains elements common to both the Richardson approach and relative price level accounting. However, it is only the general price level effects on net monetary assets, the monetary holding gains, that will be examined.

Let

MA = Circulating monetary assets, as a percentage of total assets.
NMA = Non-monetary assets, as a percentage of total assets.
L = Liabilities, as a percentage of total assets.
p = Percentage change in general level of prices.
q = Percentage change in entity-specific prices of non-monetary assets.
CCA = Current cost accounting profit change as a percentage of total assets.
CPP = Current purchasing power profit change as a percentage of total assets.
REL = Relative price level accounting profit change as a percentage of total assets.
RICH = Change in Richardson profit attributable to the owners, as a percentage of total assets.

Then for any p and q

$$\begin{aligned}
\text{CCA} &= 0\\
\text{CPP} &= -p(\text{MA} - \text{L})\\
\text{REL} &= \text{NMA}(q - p) - p(\text{MA} - \text{L})\\
\text{RICH} &= [\text{L}(q\text{NMA} + p\text{MA})/\\
&\qquad (\text{NMA}(1 + q) + \text{MA})] - p\text{MA}
\end{aligned}$$

Current cost accounting involves consideration of q only. As all holding gains (i.e. $q > 0$) are normally credited directly to a capital reserve, no

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[7] *Inflation Accounting: Report of the Inflation Accounting Committee* (Cmnd 6225, HMSO, September, 1975); The Institute of Chartered Accountants in Australia and Australian Society of Accountants, *Statement of Provisional Accounting Standards 'Current Cost Accounting'* (October, 1976); New Zealand Society of Accountants, *Accounting in Terms of Current Costs and Values* (ED14) (August, 1976). It is also noted that all of these pronouncements have since been extended (at least in the form of exposure drafts) to consider the effects of monetary items. For example, in the UK ED18 introduced the appropriation account which was interpreted as an indirect method of accounting for monetary items. This has since been amended by the Hyde Recommendations. Similarly, in July 1978 the professional bodies in Australia released an exposure draft entitled 'The Recognition of Gains and Losses on Holding Monetary Resources in the Context of Current Cost Accounting'. The net effect of these extensions is to introduce a profit (or loss) within the 'transactionless interval' construct being used here.

[8] R. J. Chambers, *Accounting, Evaluation and Economic Behavior* (Prentice-Hall, 1966).

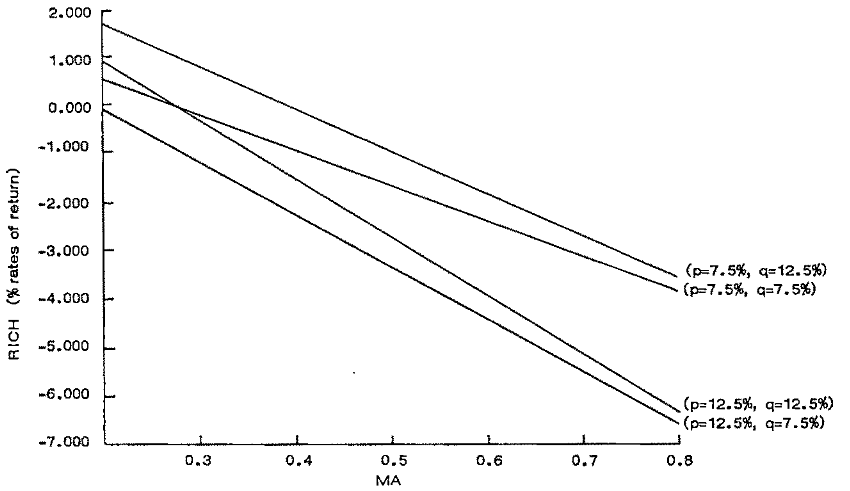

FIGURE 1
Relationship between RICH and MA ratios for selected values of p and q (L = 0.3)

gains are included in current cost income. By contrast current purchasing power accounting considers only p. Assuming $p > 0$, profits will result if $L > MA$.

Under REL, the holding gain for monetary and non-monetary assets is shown separately. If $q > p$, a real realisable cost saving,[9] $NMA(q - p)$, will arise. The derivation and an extension of this is shown immediately below:

Using P to indicate the percentage proprietors' interest, the balance sheet identity is given by

$$MA + NMA = L + P \qquad (1)$$

Multiplying through by $(1 + p)$, then adding NMA $(q - p)$ to both sides gives

$$MA + NMA\,(1 + q) = L + P\,(1 + p) + NMA\,(q - p) - p(MA - L) \qquad (2)$$

or

$$MA + NMA\,(1 + q) = L + P\,(1 + p) + qNMA - pP \qquad (3)$$

If q is now interpreted as the change in entity-specific exit prices, equation (3) shows Chambers' familiar price variation adjustment (qNMA) and offsetting capital maintenance adjustment.[10]

The differences between CPP, REL, and RICH are illustrated in Tables 1 to 4 of the Appendix for reasonable estimates of p and q. In each Table resultant rates of return for CPP, REL, and RICH are shown for various values of MA and L.

Based on those Tables, the following generalisations can be made:

1. Whereas the relationship between CPP (or REL) and the other variables is linear, the relationship between RICH and MA and q is hyperbolic.
2. When $q \geq p$, the Richardson Committee's method shows lower rates of return than the relative price level accounting method.
3. When $p > q$, the Richardson method shows higher rates of return than relative price level accounting, except in some high leverage cases.
4. When $q = p$, the 'advantage' of REL over RICH increases as gearing (leverage) increases, but decreases as the level of monetary assets increases.[11]
5. When $q > p$, the 'advantage' of REL over RICH decreases as gearing increases, and decreases as the level of monetary assets increases.

Figures 1 and 2 show the relationship between RICH and MA for given values of L[12] (0.3 and 0.7 respectively) and for selected pairs of p and q. The higher rates of return that are generated

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[9] See E. O. Edwards and P. W. Bell, *op cit.* q is now being interpreted as a replacement cost price change. In this analysis it can be regarded as a weighted average specific price change.

[10] R. J. Chambers, *op. cit.*

[11] When $p = q$, obviously CPP = REL. In other cases, CPP and REL differ by $(1 - MA)(q - p)$.

[12] The Richardson Committee refers to borrowings rather than liabilities. Some liabilities are not 'borrowings', for example Provision for Dividends, Provision for Deferred Tax. In the preceding analysis it is assumed that all liabilities are 'borrowings'.

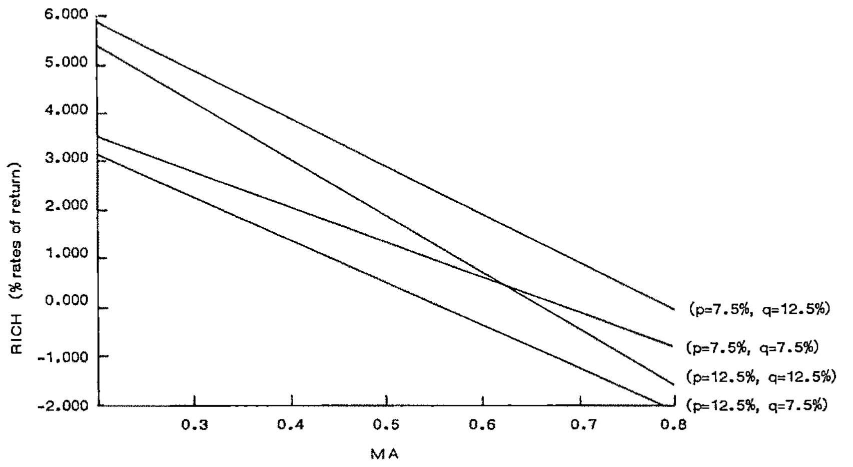

FIGURE 2
Relationship between RICH and MA ratios for selected values of p and q (L = 0.7)

with higher gearing are clearly evident, particularly if combined with relatively low levels of monetary assets. Obviously not all levels of MA will be feasible for any selected L; for example loan covenants traditionally impose limitations on capital structure, particularly in relation to gearing.

IV. Justification and critique

The Richardson Committee concurs with Sandilands in recommending that non-monetary assets should normally be valued at current cost, the objective of the exercise being to maintain the enterprise's operating capacity:

> We consider that current cost accounting meets the relevant information needs of users of accounts to a far greater degree than historical cost accounting or the other methods of accounting discussed in earlier chapters. It received substantial support in the submissions made to us and our assessment of the situation is that the accounting and commercial community clearly favours a move from historical cost accounting to a value accounting method. There are problem areas and some matters, notably the test of 'value to the business' and the impact of inflation on monetary items, where our views differ from Sandilands.[13]

The 'value to the business'/'deprival value' concept involves a comparison of replacement cost, net realisable value, and economic (i.e. present) value. In essence the relevant value is the lower of replacement cost on the one hand, and the higher of economic value and net realisable value on the other. The Richardson Committee was unhappy with this approach on both 'logical' and 'practical' grounds. For example it stated:

> Where realisable value exceeds both replacement cost and present value, it would seem that the appropriate amount which the enterprise would lose if deprived of the asset is its net realisable value, not its replacement cost. To argue that the loss is only the depreciated current replacement cost, on the grounds that the enterprise is able to replace the asset and thus regain the ability to sell for net realisable value, ignores the fact that all values relate to the age of an existing asset, whereas what the enterprise would pay for replacement would almost certainly be the new price of a similar asset.[14]

The Committee's main concern with deprival value relates to 'practical problems'. Firstly they considered that it would be uneconomic and impractical to consider three valuation bases when only one (usually replacement cost) is to be used. Secondly, they had doubts about the ability of many enterprises to produce satisfactory estimates of present value after an acquisition decision had been made. Instead they settled on an approach embodied in the Australian exposure draft,[15] namely 'essential to the business',[16] but gave this phrase a very broad meaning.

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[13] *The Report of the Committee of Inquiry into Inflation Accounting*, para. 13.21.

[14] *Ibid.*, para. 15.11.

It was on the question of monetary items that the Report breaks new ground. The Committee stated:

> There is no doubt that inflation exists. And if inflation exists it means quite simply that the value of money is declining. Any method of accounting which ignores completely the effects of inflation on monetary items cannot be said to be accounting for inflation.[17]

Further they stated:

> Rising prices will result in an enterprise requiring an increase in the dollar amount of monetary assets to service its operations in the same way that the increased price of stock requires a continually higher level of investment in this asset. This pool of monetary assets ... is ... what we describe as its circulating monetary assets. This class of monetary asset is essentially linked with the enterprise's ability to provide goods and services. If the ability of the monetary assets to carry out their function is affected by changes in prices, we believe that this should be measured and taken into account in arriving at the current cost operating profit of the enterprise.[18]

The committee distinguished circulating monetary assets from fixed monetary assets. While circulating monetary assets are necessary to service normal operations (eg. trade accounts receivable), fixed monetary assets are simply monetary investments:

> We conclude that no adjustment reflecting purchasing power or market price changes in respect of fixed monetary assets is required to arrive at the current cost operating profit of the enterprise. Where the monetary asset is valued at current cost, the change in value should be reflected through the capital maintenance reserve in the case of fixed monetary assets, and through the current cost operating profit in the case of circulating monetary assets.[19]

For banks and other financial intermediaries, the Committee recommended that all monetary assets be regarded as circulating.

In these calculations no account is taken of liabilities. The importance of liabilities emerges when determining what portion of the increase in capital maintenance reserve is distributable. The Committee stated:

> We believe that the current cost operating profit of the enterprise cannot be the same amount as the profit attributable to the owner, except where there are no outside liabilities. Whereas the current cost operating profit of the enterprise measures the amount which, after taking into account the liability for tax, can be distributed to all contributors of capital (that is, interest and dividends or other distributions to owners) without impairing the operating capacity of the enterprise, the profit attributable to the owner is the amount that can be distributed without impairing the operating capacity of the owners' investment in the enterprise. The operating capacity of the owners' investment is that proportion of the enterprise's assets financed by the owners' capital.[20]

The relationship between these two profit concepts is:

Current cost operating profit of the enterprise		XXX
Deduct:	Interest	(XXX)
Add:	Increase in capital maintenance reserve financed by borrowings	XXX
	Profit attributable to the equity owners	XXX

At the same time it is inevitable that matters of conjecture will surface. The final section of this note is devoted to some criticisms of the report.

1. The discussion throughout the Richardson Report assumes that replacement costs are different from realisable values or economic (i.e., present) values. This is tantamount to assuming that markets are imperfect.

   A consequence of this assumption is to deny the existence of any price reporting rule which is relevant to all investors. It is only when markets are perfect that prices can be shown to provide utility free decision rules. The most common illustration of this proposition is the establishment of the present value rule, given perfect capital markets. Differing individual shareholder utility functions are thus irrelevant in establishing the firm's optimal production investment decision. In the absence of perfect markets, there is no non-dictatorial way in which the different preferences of individual shareholders can be summed into a global firm preference function.[21] If we are to adopt the seemingly relevant disciplinary matrix of economics, we can interpret the emphasis on current costs (particularly utilising index numbers) as a cost efficient method of establishing the implicit relevant present value.

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[15] 'A Method of Current Value Accounting', Preliminary Exposure Draft (June, 1975).

[16] *Op. cit.*, para. 15.17, where it stated 'An asset which is essential to the enterprise is one which in the normal course of business would be replaced if it were disposed of, whether or not the replacement asset would be physically identical.'

[17] *Ibid.*, para. 18.04.

[18] *Ibid.*, para. 18.10.

[19] *Ibid.*, para. 18.11.

[20] *Ibid.*, para. 18.11.

It is abundantly clear that information costs are relevant:

> Information costs are the costs of transportation from ignorance to omniscience, and seldom can a trader afford to take the entire trip.[22]

If we do not adopt this framework we are confronted by an Impossibility Theorem.[23] Without the framework, arguments in favour of one method over another cannot be global, but are merely assertions. It is noted that a lot of people are making similar sorts of assertions which point in the direction of current costs being relevant, so the asserters believe, to a lot of users' decisions. The justification of the Richardson Report (or indeed any report which recommends that one method is superior to another) is simply the belief of the committee members that a particular information set will satisfy some, perhaps most, users' decision models.

Given this scenario, there does not seem to be any justification for such recommendations to be mandatory.

2. Like Sandilands, the Richardson Committee embarks on its discussion of the nature of income with a derivation of the Hicksian definition of income. The committee states:

   > Income is the maximum value which the business can distribute during an accounting period and still expect to be as well off at the end of the period as it was at the beginning.[24]

   This is an *ex ante* concept that Hicks develops for an individual as part of the analysis of welfare economics. The connection between the Hicksian concept[25] and one useful for the Richardson Committee involves substituting an *ex post* concept for an *ex ante* one, and businesses for individuals. This is not to deny the importance of *ex post* calculations. As Hicks states '*ex post* calculations... have their place in economic and statistical *history*'.[26] The important point is that the definition was developed for *ex ante* economic analysis, not for reporting business history.
3. Further, the definition is uninterpreted. An interpretation[27] is the relationship between the concept and the symbol representing it. It would seem that 'income' can be interpreted in a number of different ways. Indeed, even a casual perusal of the accounting literature will reveal that this is exactly what has happened. If this is so, the merits of one particular interpretation (i.e. current costs) must be clearly demonstrated. This has not been done. Instead, the tenor of the argument is that the notion of income *per se* implies current costs.
4. The extensions of the Richardson Report depend upon two basic divisions: fixed from circulating monetary assets, and borrowings from non-borrowings. Any dichotomies such as these will create problems. For example, accrued expenses are treated as a 'non-borrowing' in the Report, but creditors as a borrowing.[28] This justification, which presumably has something to do with the timing of receipt of a demand for payment, is unclear. Similarly the distinction between fixed and circulating monetary investments is unclear. In New Zealand a large number of companies involved in primary production provide long term house mortgages to a wide range of employees, and yet mortgages are classified as fixed monetary assets.

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[21] Ray Ball, 'On Valuation in Accounting', unpublished manuscript (University of Queensland, 1975).

[22] George J. Stigler, 'Imperfections in the Capital Markets', *Journal of Political Economy*, May/June, 1967, p. 291.

[23] In fact we are confronted by more than one impossibility theorem. Demski has shown that no set of standards exists that will always rank accounting alternatives in relation to consistent *individual* preferences and beliefs. See Joel S. Demski, 'The General Impossibility of Normative Accounting Standards', *Accounting Review*, October, 1973, pp. 718–723. As well, there is no way of moving from complete transitive preferences at the individual to *group* level. This latter notion is commonly known as Arrow's Impossibility Theorem.

[24] *Op. cit.*, para. 4.02.

[25] Hicks states 'we shall be well advised to eschew *income* and saving in economic dynamics. They are bad tools which break in our hands', *Value and Capital* (Clarendon Press, 1946) p. 177.

[26] *Ibid.*, p. 179.

[27] R. Mattessich, 'Methodological Preconditions and Problems of a General Theory of Accounting', *Accounting Review*, July, 1972, pp. 469–487.

[28] The procedures that the Richardson Committee recommends force some liabilities to be treated as 'non-borrowings'. For example, 'Provision for Taxation' and 'Provision for Dividend' will not be known until *after* profit is calculated, whereas 'Increase in capital maintenance reserve financed by borrowings' is a component of that same profit figure.

5. The New Zealand Society of Accountants, among others, has questioned the Richardson Committee's conclusion that circulating monetary assets can be separated from the liabilities that finance them. In particular the association between current monetary assets and current liabilities is part of an integrated working capital cycle. This is a feature of CPP and REL, where p is applied to $(MA - L)$.
6. The recommendation of the Richardson Committee relating to non-monetary assets is that they be valued at either current replacement cost or (rarely) net realisable value, the sole criterion being one of 'essentiality'. Assuming that we can solve the aggregation issue and identify an asset to measure, we still may find ourselves facing a situation in which an asset will be neither replaced nor sold.[29] It is in situations such as this that 'value to the owner' is present value, or where, in the Australian context, recoverable amount (other than net realisable value) is relevant. Given that problems of this sort already exist within traditional historical cost accounting, it is abundantly clear that the incidence of such problems will increase with rising specific prices.
7. Contrary to Sandilands, the Richardson Committee concluded that current cost accounting could not be introduced without changes to the Companies Act, making it explicit that accounts prepared on a current cost basis would give a true and fair view of the profits and state of affairs of the reporting entity. This attitude was presumably a result of the submission made to the Richardson Committee by the New Zealand Law Society in which it was stated:

   > Our opinion is that in times of substantially changing costs and values, a 'true and fair' view of the affairs of a company and the results of its business will not necessarily be conveyed by accounts prepared according to historic cost principles. Where accounts prepared on the historic cost principles show costs and values substantially different from current costs and values, we believe that the obligation of the company, the directors, and the auditors, under the Act to present accounts showing a 'true and fair view' will not be discharged by presenting historic cost accounts.[30]

   Given this attitude it is perhaps surprising that no litigation has been aimed at company auditors specifically on the question of differences between historical cost, and current value, however defined.[31] After all, such differences are hardly new. It is surprising too, that having referred to 'true and fair view' as 'imprecise if not nebulous'[32] they should later advocate its retention, as if its interpretation will suddenly become clear on the introduction of current cost methods. Given the conceptual and procedural difficulties outlined here and elsewhere,[33] such a view seems hardly justified.
8. Finally, the notion of 'profit attributable to the owner' requires careful interpretation. It is described as the amount that can be distributed without impairing the operating capacity of the owners' investment in the enterprise.[34] If an increase in specific prices is less than the rise in general prices (i.e., $q < p$) the position of the owner in terms of general prices has deteriorated. If we view the owners as attempting to solve a multi-period consumption problem (hence investment is deferred consumption), then owners have not maintained their 'operating capacity' if this expression is interpreted in terms of command over owner-oriented (i.e., consumption) goods and services.[35]

V. Concluding remarks

It is clear, however, that the likelihood of adoption of The Richardson Report is largely independent of its quality. In spite of the fact that The Richardson Committee has offered a solution to the monetary items question, and provides a detailed evaluation of current cost accounting as a viable alternative to 'traditional' methods, the adoption question is clearly dependent on a number of tense political issues.[36] For example, the Committee recommended the adoption of current cost accounting for taxation and price control purposes, as well as for financial reporting, regarding the recommendations as a package. It is far from evident that either the unions or the taxation authorities will find such a package acceptable.

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[29] For example, consider an asset the depreciated replacement cost of which is 50,000 monetary units, net realisable value is 10,000 monetary units, and undiscounted expected future cash flows from the remaining useful life 40,000 monetary units. For reasonable estimates of useful life and the discount rate, economic value would be between replacement cost and realisable value. Within the context of the Australian Provisional Standard, recoverable amount would be 40,000 monetary units.

[30] *Op. cit.*, para. 3.09.

[31] Such 'surprise' is obviously qualified by the complexity of the law relating to auditors' liability to third parties.

[32] *Ibid.*, para. 3.08.

[33] Other procedural difficulties relating to the Richardson Report not discussed here include the calculation of increase in capital maintenance reserve financed by borrowings for subsidiaries and associates, the calculation of profit attributable to the owners for trustee corporations and other institutions where owners are not clearly identifiable, the treatment of financial leases, and accounting for deferred taxation.

[34] *Op. cit.*, para. 19.04.

[35] Regarding investment (i.e. capital maintenance) as deferred consumption would link accounting more satisfactorily with finance theory, the nexus of which is a two-period investment opportunity schedule, given utility of consumption maximising behaviour by individuals.

Further, although the New Zealand Society of Accountants has officially given the recommendations of The Richardson Report its blessing, a reaction on the part of individual members of the profession (especially small practitioners) not dissimilar to that experienced in the UK is a distinct possibility. Once again, this is regardless of the clarity of the Report *per se* but is the reaction of busy professionals protecting their educational investment. From a purely implementational point of view, therefore, the undoubted quality of the Report becomes irrelevant.

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[36] That is, accounting standard setting can be regarded as a political process. See for example C. T. Horngren, 'The Marketing of Accounting Standards', *Journal of Accountancy*, October, 1973, pp. 61–66. It is suggested that managerial attitudes towards changing accounting principles, including such changes as the partial or complete abandonment of historical cost accounting in favour of some alternative like current cost accounting, can best be seen as a complex reaction to various factors affecting cash flows, such as taxation changes, managerial compensation changes, and increased regulation, as well as political costs. See R. L. Watts and J. L. Zimmerman, 'Towards a Positive Theory of the Determination of Accounting Standards', *Accounting Review*, January 1978, pp. 112–134.

Appendix

Table 1

CPP, relative price level accounting, and Richardson rates of return for given relative price changes in an entity-transactionless interval (expressed as a percentage of total assets employed)
In this table $p = 7.5\%$, $q = 7.5\%$

L	0.2			0.3			0.4			0.5			0.6			0.7			0.8		
MA	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH
0.2	0.000	0.000	−0.085	0.750	0.750	0.623	1.500	1.500	1.330	2.250	2.250	2.038	3.000	3.000	2.745	3.750	3.750	3.453	4.500	4.500	4.160
0.3	−0.750	−0.750	−0.825	0.000	0.000	−0.112	0.750	0.750	0.600	1.500	1.500	1.312	2.250	2.250	2.025	3.000	3.000	2.738	3.750	3.750	3.451
0.4	−1.500	−1.500	−1.565	−0.750	−0.750	−0.847	0.000	0.000	−0.129	0.750	0.750	0.589	1.500	1.500	1.306	2.250	2.250	2.024	3.000	3.000	2.742
0.5	−2.250	−2.250	−2.304	−1.500	−1.500	−1.581	−0.750	−0.750	−0.858	0.000	0.000	−0.135	0.750	0.750	0.587	1.500	1.500	1.310	2.250	2.250	2.033
0.6	−3.000	−3.000	−3.044	−2.250	−2.250	−2.315	−1.500	−1.500	−1.587	−0.750	−0.750	−0.859	0.000	0.000	−0.131	0.750	0.750	0.597	1.500	1.500	1.325
0.7	−3.750	−3.750	−3.783	−3.000	−3.000	−3.049	−2.250	−2.250	−2.316	−1.500	−1.500	−1.582	−0.750	−0.750	−0.849	0.000	0.000	−0.115	0.750	0.750	0.618
0.8	−4.500	−4.500	−4.522	−3.750	−3.750	−3.783	−3.000	−3.000	−3.044	−2.250	−2.250	−2.305	−1.500	−1.500	−1.566	−0.750	−0.750	−0.828	−0.000	0.000	−0.089

L = Liabilities/total assets
MA = Monetary assets/total assets
p = Change in general level of prices
q = Change in specific prices

Table 2

CPP, relative price level accounting, and Richardson rates of return for given relative price changes in an entity-transactionless interval (expressed as a percentage of total assets employed)
In this table $p = 7.5\%$, $q = 12.5\%$

L	0.2			0.3			0.4			0.5			0.6			0.7			0.8		
MA	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH
0.2	0.000	4.000	0.591	0.750	4.750	1.636	1.500	5.500	2.682	2.250	6.250	3.727	3.000	7.000	4.773	3.750	7.750	5.818	4.500	8.500	6.864
0.3	−0.750	2.750	−0.227	0.000	3.500	0.784	0.750	4.250	1.796	1.500	5.000	2.807	2.250	5.750	3.819	3.000	6.500	4.830	3.750	7.250	5.842
0.4	−1.500	1.500	−1.046	−0.750	2.250	−0.070	0.000	3.000	0.907	0.750	3.750	1.884	1.500	4.500	2.860	2.250	5.250	3.837	3.000	6.000	4.814
0.5	−2.250	0.250	−1.868	−1.500	1.000	−0.926	−0.750	1.750	0.015	0.000	2.500	0.956	0.750	3.250	1.898	1.500	4.000	2.838	2.250	4.750	3.779
0.6	−3.000	−1.000	−2.690	−2.250	−0.250	−1.786	−1.500	0.500	−0.881	−0.750	1.250	0.024	0.000	2.000	0.929	0.750	2.750	1.833	1.500	3.500	2.738
0.7	−3.750	−2.250	−3.515	−3.000	−1.500	−2.648	−2.250	−0.750	−1.780	−1.500	0.000	−0.913	−0.750	0.750	−0.042	0.000	1.500	0.822	0.750	2.250	1.690
0.8	−4.500	−3.500	−4.341	−3.750	−2.750	−3.512	−3.000	−2.000	−2.683	−2.250	−1.250	−1.854	−1.500	−0.500	−1.024	−0.750	0.250	−0.195	0.000	1.000	0.634

L = Liabilities/total assets
MA = Monetary assets/total assets
p = Change in general level of prices
q = Change in specific prices

Table 3

CPP, relative price level accounting, and Richardson rates of return for given relative price changes in an entity-transactionless interval (expressed as a percentage of total assets employed)
In this table $p = 12.5\%$, $q = 7.5\%$

L	0.2			0.3			0.4			0.5			0.6			0.7			0.8		
MA	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH
0.2	0.000	−4.000	−0.896	1.250	−2.750	−0.094	2.500	−1.500	0.707	3.750	−0.250	1.509	5.000	1.000	2.311	6.250	2.250	3.113	7.500	3.500	3.915
0.3	−1.250	−4.750	−2.040	0.000	−3.500	−1.185	1.250	−2.250	−0.330	2.500	−1.000	0.525	3.750	0.250	1.381	5.000	1.500	2.236	6.250	2.750	3.091
0.4	−2.500	−5.500	−3.182	−1.250	−4.250	−2.273	0.000	−3.000	−1.364	1.250	−1.750	−0.454	2.500	−0.500	0.454	3.750	0.750	1.364	5.000	2.000	2.273
0.5	−3.750	−6.250	−4.322	−2.500	−5.000	−3.358	−1.250	−3.750	−2.395	0.000	−2.500	−1.431	1.250	−1.250	−0.467	2.500	0.000	0.497	3.750	1.250	1.461
0.6	−5.000	−7.000	−5.461	−3.750	−5.750	−4.442	−2.500	−4.500	−3.422	−1.250	−3.250	−2.403	0.000	−2.000	−1.383	1.250	−0.750	−0.364	2.500	0.500	0.655
0.7	−6.250	−7.750	−6.598	−5.000	−6.500	−5.523	−3.750	−5.250	−4.447	−2.500	−4.000	−3.371	−1.250	−2.750	−2.295	0.000	−1.500	−1.219	1.250	−0.250	−0.144
0.8	−7.500	−8.500	−7.734	−6.250	−7.250	−6.601	−5.000	−6.000	−5.468	−3.750	−4.750	−4.335	−2.500	−3.500	−3.202	−1.250	−2.250	−2.069	0.000	−1.000	−0.936

L = Liabilities/total assets
MA = Monetary assets/total assets
p = Change in general level of prices
q = Change in specific prices

Table 4

CPP, relative price level accounting, and Richardson rates of return for given relative price changes in an entity-transactionless interval (expressed as a percentage of total assets employed)
In this table $p = 12.5\%$, $q = 12.5\%$

L	0.2			0.3			0.4			0.5			0.6			0.7			0.8		
MA	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH	CPP	REL	RICH
0.2	0.000	0.000	−0.227	1.250	1.250	0.909	2.500	2.500	2.045	3.750	3.750	3.182	5.000	5.000	4.318	6.250	6.250	5.454	7.500	7.500	6.591
0.3	−1.250	−1.250	−1.451	0.000	0.000	−0.302	1.250	1.250	0.848	2.500	2.500	1.997	3.750	3.750	3.147	5.000	5.000	4.296	6.250	6.250	5.445
0.4	−2.500	−2.500	−2.674	−1.250	−1.250	−1.512	0.000	0.000	−0.349	1.250	1.250	0.814	2.500	2.500	1.977	3.750	3.750	3.139	5.000	5.000	4.302
0.5	−3.750	−3.750	−3.897	−2.500	−2.500	−2.721	−1.250	−1.250	−1.544	0.000	0.000	−0.368	1.250	1.250	0.809	2.500	2.500	1.985	3.750	3.750	3.162
0.6	−5.000	−5.000	−5.119	−3.750	−3.750	−3.929	−2.500	−2.500	−2.738	−1.250	−1.250	−1.548	0.000	0.000	−0.357	1.250	1.250	0.833	2.500	2.500	2.024
0.7	−6.250	−6.250	−6.340	−5.000	−5.000	−5.135	−3.750	−3.750	−3.931	−2.500	−2.500	−2.726	−1.250	−1.250	−1.521	0.000	0.000	−0.316	1.250	1.250	0.889
0.8	−7.500	−7.500	−7.561	−6.250	−6.250	−6.341	−5.000	−5.000	−5.122	−3.750	−3.750	−3.902	−2.500	−2.500	−2.683	−1.250	−1.250	−1.463	0.000	0.000	−0.244

L = Liabilities/total assets
MA = Monetary assets/total assets
p = Change in general level of prices
q = Change in specific prices

The Matching Concept and Cost Allocation

Shu S. Liao

One of the most pervasive principles in accounting is the concept of matching. The concept was first espoused by academicians[1] and was widely accepted by the academic and practising accountants in the USA as well as the UK.[2] A number of authoritative sources of accounting principles referred to matching as one of the basic processes of income determination.

Recently, the matching concept is increasingly becoming a subject of dispute among accountants. One author described the current status as the 'fall of the matching principle.'[3] Rightfully or wrongfully, there is a move away from the matching concept, as is evident in the Accounting Principles Board's Statement No. 4 which explicitly avoids using the term 'matching' because of the variety of its meanings.[4] The same reasoning was cited by the Financial Accounting Standards Board in reaching conclusions for FASB Statements No. 2 and No. 5. In its conceptual framework project, the first issue raised by the FASB related to two distinct conceptual views of earnings: (1) the asset/liability view and (2) matching cost and revenue view.[5] Since the outcome of the FASB's conceptual framework project is deemed to decide the course of accounting and financial reporting for many years to come, it is evident that the rise and fall of the matching concept will become clear in the near future.

The purpose of this paper is to put the issue of the matching concept in proper perspective so that the right kind of questions can be raised at this critical time. Without the right kinds of questions, the search for solutions will be devious, if not wholly unproductive.

The matching concept was the outcome of inductive reasoning. Developments of financial accounting principles since its inception in 1940 have demonstrated the erroneous deductive application of the matching concept, thus contributing to the current doubt on the usefulness of the concept. This paper will trace the relationship between the allocation of cost and the matching concept, analyse the conceptual underpinning of cost allocation, and examine how the matching concept can be made more acceptable.

The origins of the matching concept

Although the concept of matching was not mentioned in the accounting literature until Paton and Littleton introduced the term in 1940, the idea of matching had long been deeply embedded in accounting practice. Prior to 1940, 'attention was concentrated on the facts of existing practice, and on the relative merits of alternative procedures and interpretations.'[6] The literature which grew up was marked by a wide variety of proposals as to what might be considered 'sound accounting'. Paton and Littleton's work represents the first attempt to elaborate a coherent, coordinated, consistent body of doctrine essential to a sound fundamental structure of accounting.

The idea of matching was evident in these early writings before the concept was formally introduced:

> Just as the accounts should show, at the end of the fiscal period, all the income during the period, they should also show all the expenses

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[1] W. A. Paton and A. C. Littleton, *An Introduction to Corporate Accounting Standards* (American Accounting Association, 1940), p. 7.

[2] For extensive literature reference dealing with the pervasiveness of matching in the USA and the UK see Kenneth S. Most, 'The Rise and Fall of the Matching Principle,' *Accounting and Business Research*, Autumn 1977, pp. 286–290.

[3] Kenneth Most, *op. cit.*, p. 286.

[4] APB Statement No. 4, *Basic Concepts and Accounting Principles Underlying Financial Statements of Business Enterprises* (AICPA, 1970), p. 57.

[5] Financial Accounting Standards Board, *An Analysis of Issues Related to Conceptual Framework for Financial Accounting and Reporting: Elements of Financial Statements and Their Measurement* (FASB, 1976).

[6] Paton and Littleton, *op. cit.*, p.v.

> incurred in earning that income.[7] [Income Statement]... indicating the source of revenues and the various costs incurred in securing them.[8]

Paton and Littleton's acceptance of this process of income determination is reflected in the following statement when they introduced the concept of matching cost with revenue:

> The revenues of a particular period should be charged with the costs which are reasonably associated with the product represented by such revenues.[9]
>
> The principal concern of accounting is the periodic matching of costs and revenues as a test-reading by which to gauge the effect of the efforts expended.[10]

The concept was quickly adopted by the American Accounting Association (AAA) Executive Committee when it stated in 1941 that 'income is measured by matching revenues realized against costs consumed or expired, in accordance with the cost principle.'[11] Since then, the use of the matching concept has been widely accepted in the USA and the UK as a criterion by which accounting methods are judged.

Rationalisation of cost allocation

As mentioned earlier, the matching concept was the outcome of inductive reasoning; upon examining the reason for the emergence of the concept, one can readily see that matching is essentially the rationalisation of cost allocation which was widely practised by accountants and accepted by management. Paton and Littleton stated:

> Costs are traced carefully from the first acquisition of goods or services through various regroupings for the specific object of having available, at the time of sale of the product, information regarding relevant costs—that is, those costs related to a specific segment of revenue because they are technically or economically associated with a corresponding segment of product, or unit of time in which such product appears.[12]
>
> Accounting for cost involves three stages: (1) ascertaining and recording costs as incurred, appropriately classified; (2) tracing and re-classifying costs in terms of operating activity; (3) assigning costs to revenues.[13]

The second stage refers to intra-period cost allocation among various organisational segments and product groups. The third stage refers to inter-period cost allocation for periodic income measurement. What should the basis be for inter-period and intra-period allocation? Paton and Littleton's conception obviously is both vague and incomplete:

> The problem of properly matching revenues and costs is primarily one of finding satisfactory bases of association.... Observable physical connections often afford a means of tracing and assigning. It should be emphasized, however, that the essential test is reasonableness, in the light of all the pertinent conditions, rather than physical measurement.[14]

Thus, Paton and Littleton rationalised cost allocation without giving adequate guidance as to the acceptable allocation basis.

The 1964 AAA Concepts and Standards Research Study Committee on the matching concept attempted to spell out the criterion for acceptable allocation. The Committee advocated that:

> Costs (defined as product and service factors given up) should be related to revenues realized within a specific period on the basis of some discernible positive correlation of such costs with the recognized revenues.[15]

Costs related to period revenue are judged to fall into three categories. The first group of costs is characterised as direct costs in that they can be associated directly with specific results. The second group of outlays is labelled indirect costs. They are associated with a group of results and have little in the way of identifiable causal relationship with any specific segments of revenue. The third group of costs is characterised as losses. The test for positive correlation for the last two groups is that, on the basis of past experience and reasonable expectations for the future, the costs would be deferred and matched with the revenue of subsequent periods if there is an apparent ability to produce future revenue.

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[7] J. O. McKinsey and H. S. Noble, *Accounting Principles* (Cincinnati: South-Western Publishing Co., 1935), p. 253.

[8] G. R. Husband and O. E. Thomas, *Principles of Accounting* (Boston: Houghton–Mifflin Co., 1935), p. 33.

[9] Paton and Littleton, *op. cit.*, p. 69.

[10] *Ibid.*, p. 7.

[11] AAA Executive Committee, 'Accounting Principles Underlying Corporate Financial Statements' in *Accounting and Reporting Standards for Corporate Financial Statements and Preceding Statements and Supplements* (AAA, 1957), p. 55.

[12] Paton and Littleton, *op. cit.*, p. 15.

[13] *Ibid.*, p. 69.

[14] *Ibid.*, p. 71.

[15] AAA Concepts and Standards Research Study Committee—The Matching Concept, 'The Matching Concept,' *Accounting Review*, April 1965, p. 369.

As a departure from Paton and Littleton's original concept of matching, the AAA Committee recommended the use of replacement value for matching purposes: 'The Committee proposes that, within the limits of practicality, the directly related product and service factors given up be measured in terms of their *replacement value* at the time they are positively correlated with period revenue.'[16]

The AAA committee's report probably was the root of misconceptions such as 'matching is an assumption in that accountants assume that there is a cause and effect relationship between expense and revenue.'[17] In the implementation phase, there has been very limited success in arriving at this assumed functional relationship of positive correlation between costs and revenues.

Inconsistent allocation bases

The ambiguity of the matching concept as a guide to cost allocation can be seen from the following comment by Arthur Thomas:

> Practitioners have honestly believed that allocations are appropriate and have struggled to cope with them, while we academics saddled practitioners with a matching theory that requires such assignments, then failed to provide defensible ways for their calculation.[18]

It should be noted, however, that the crux of the problem is not the matching concept *per se*, but its lack of a defensible basis of associating cost with revenue. In the absence of an acceptable basis of association, accountants have used a wide variety of bases for allocating and reallocating costs. The literature is replete with conflicting and not mutually exclusive criteria for choosing a cost allocation basis. Among the more frequently used criteria are observable physical connection, causal relationship, beneficial relationship and ability-to-bear.

The most widely accepted basis of association is observable physical connection. If a cost can be physically identified with a cost object or a segment of revenue, then cost allocation based on physical quantity is easily defensible. Allocation of direct costs to the economic activity within a single year and inter-period allocation of inventory costs are the most conspicuous examples found in practice.

When direct allocation based on observable physical connection is not possible, some intervening base is needed to establish the relationship between the cost incurred and the economic activities to absorb the cost. The accountant traditionally looks for evidence that provides any likely trail of causal relationship. There are two kinds of causal relationship: qualitative causality, which is in our minds and discerns causality in a logical sense, and quantitative correlation, which uses formal statistical means to determine the extent to which a change in one factor is accompanied by a change in another factor. Ideally, qualitative causality should be coupled with quantitative correlation. In reality, this is not always possible. Insistence on positive correlation probably is the result of confusing cause with effect. We may be able to identify the cause of a cost item, but often we cannot isolate the effect of the cost. Even if we can isolate the effect of the cost, the magnitude may not be in direct proportion to the amount of cost expended.

The term 'cause and effect relationship' seems to have been used too loosely in accounting. The following quotations are worth noting:

> A cause and effect relationship should be discernible as the basis for matching costs with realized revenues.[19] Matching is an assumption in that accountants assume that there is a cause and effect relationship between expense and revenue.[20]

Although causal relationship implies a certain degree of beneficial relationship between the incurrence of the cost and the effect it generates, the two are not identical because of interaction. Arthur Thomas's main argument against allocation is based on the fact that inputs to a process interact with each other when they generate an output different from the total of what they would have yielded separately.[21] For example, a machine operator and a machine interact with each other whenever the operator and the machine working together produce more than the total of what the operator could make with his bare hands and the machine could make untended. Thus, whenever inputs interact, calculations of how much benefits or effect has been contributed by any individual cost input are as meaningless as calculations of the proportion of a man's services due to his heart, lungs, or brain. Unfortunately, much literature has maintained that costs should be assigned to operations or revenues according to the relative benefits received by each.

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[16] *Ibid.*, p. 371.

[17] Glen L. Johnson and James A. Gentry, Jr., *Finney and Miller's Principles of Accounting*, Intermediate (Englewood Cliffs, N.J.: Prentice-Hall, 1974), p. 74.

[18] Arthur L. Thomas, 'The FASB and the Allocation Fallacy,' *Journal of Accountancy*, November 1975, p. 68.

[19] AAA Committee—The Matching Concept, *op. cit.*, p. 369.

[20] See footnote 17.

[21] See Arthur Thomas, *The Allocation Problem in Financial Accounting Theory*, Studies in Accounting Research No. 3 (AAA: 1969); *The Allocation Problem: Part Two*, Studies in Accounting Research No. 9 (AAA: 1974).

Beneficial relationship also introduces a value-added test that leads to another allocation criterion widely practised by accountants—ability-to-bear. Beneficial relationship still embraces a certain degree of causal criterion, no matter how small, but ability-to-bear (such as relative sales dollars or relative market values) essentially implies a rejection of the causal relationship criterion. The use of the ability-to-bear criterion lends to the allocation an aura of precision and objectivity that is completely unjustifiable—theoretically and empirically.

CASB's cost allocation model

As mentioned earlier, accounting theorists rationalised cost allocation without giving adequate guidance as to the acceptable allocation basis. Furthermore, various authoritative bodies of the accounting profession were partially to blame for explicitly or implicitly accepting the matching concept without attempting to clarify its inherent ambiguity. Until recent years, little attention, if any, had been given to the methods of cost allocation. The inconsistent allocation bases have many of their roots in the concepts that underlie our notions of accounting items such as assets, expenses, etc. Although cost allocation is as much a part of accounting as assets, liabilities and income, no attempt was made by the authoritative bodies to improve the methods of allocation. This situation has changed somewhat with the advent of the Cost Accounting Standards Board (CASB)

The CASB was established by the US Congress to promulgate accounting standards to be followed by government contractors, to achieve uniformity and consistency in the field of cost determination, and to cure certain alleged abuses in cost accounting practices. Despite this limited purpose, the Board's impact upon financial reporting in general should not be underestimated. For one thing, CASB rules now apply to virtually all companies having negotiated contracts in excess of $100,000 with the US Government. This obviously affects a sizable portion of American business. For another, one of the weaknesses of 'generally accepted accounting principles' is that, although the alternative methods are well known, the criteria for the use of each alternative method have never been established. CASB rules tend to fill this vacuum.

Figure 1 describes the cost allocation model as the Uniform Cost Accounting Standards[22] set forth. Costs are classified at the time they are incurred: (1) as capitalised costs of assets (Standard 404), (2) as charges to specific final cost objectives (direct costs) or (3) to organisational segments (indirect costs). The initial classification of costs is followed by a series of allocations of costs until the point when all costs are assigned to commercial or government business (final cost objectives). Direct costs are to be allocated directly to specific final cost objectives. Indirect costs follow the order of allocations described in Figure 1.

The allocation of home office expenses to segments suggests that the CASB is stressing the causal relationship between supporting and receiving economic activities. Those costs incurred for specific segments are to be allocated directly to those segments. Those costs incurred for various segments and whose relationship to those segments can be measured on some objective basis are to be grouped in logical and homogeneous pools and allocated following a hierarchy of allocation methods. They are, in the order of preference, (1) based on the activity of supporting function, (2) based on the output of the supporting function, and (3) based on the activity of the segments receiving the service. Although there is probably a certain degree of arbitrariness involved in these allocation methods, the fact remains that the causal relationship basis is selected over beneficial relationship and ability-to-bear bases. As to the use of a three-factor formula to allocate the residual expense pool, it can only be justified on the ground of uniformity.

Costs of segments serving other segments are allocated on the basis of a causal or beneficial relationship. Then costs of segments serving contracts and other segments are allocated, again on the basis of a beneficial or causal relationship if possible (Standard 410). It is obvious that the

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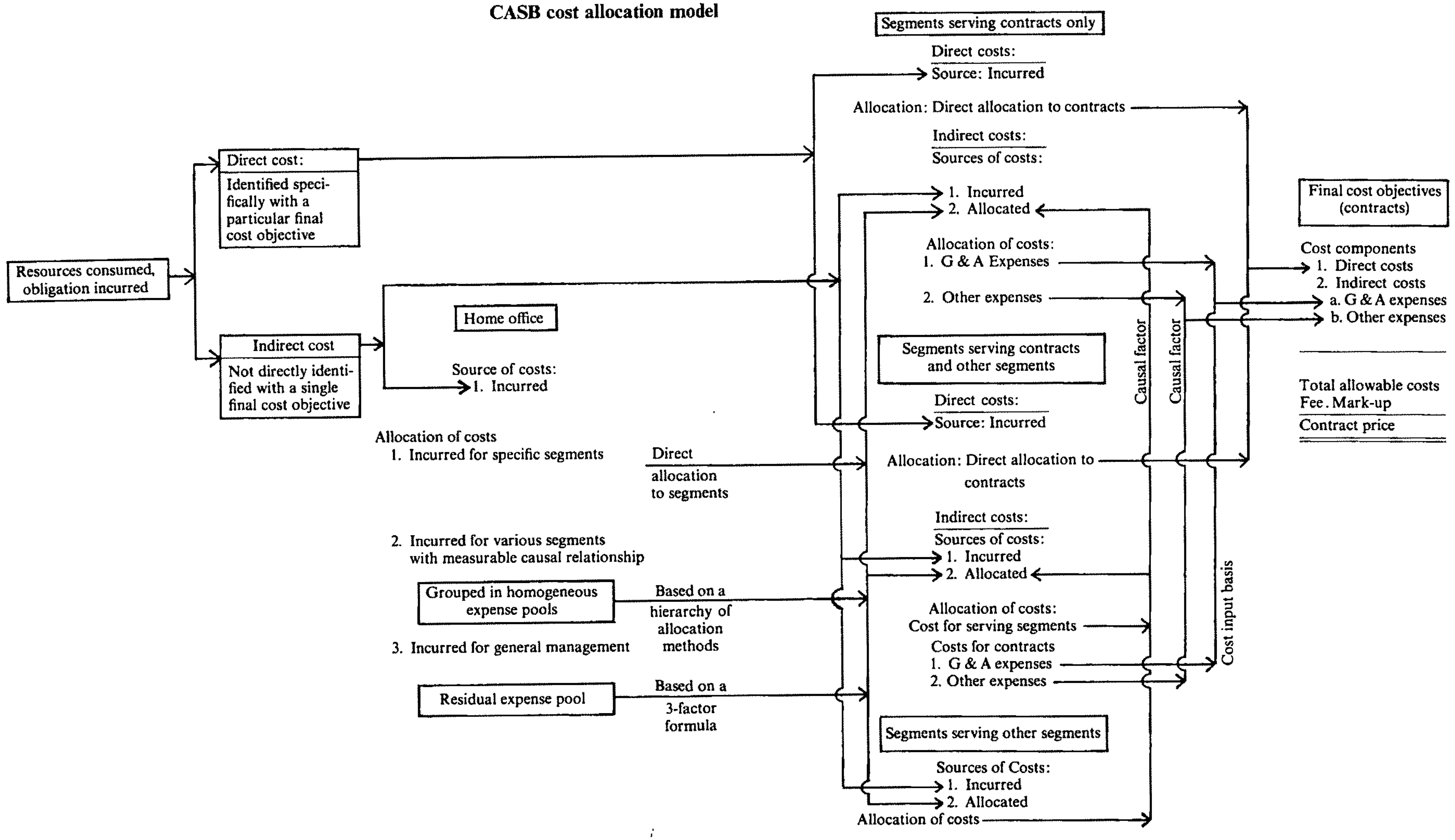
[22] Cost Accounting Standards Board, *Standards, Rules & Regulations* (US Government Printing Office).

FIGURE 1
CASB cost allocation model


Resources consumed, obligation incurred
Direct cost:
Identified specifically with a particular final cost objective
Indirect cost
Not directly identified with a single final cost objective
Home office
Source of costs:
1. Incurred
Allocation of costs
1. Incurred for specific segments
Direct allocation to segments
2. Incurred for various segments with measurable causal relationship
Grouped in homogeneous expense pools
Based on a hierarchy of allocation methods
3. Incurred for general management
Residual expense pool
Based on a 3-factor formula
Segments serving contracts only
Direct costs:
Source: Incurred
Allocation: Direct allocation to contracts
Indirect costs:
Sources of costs:
1. Incurred
2. Allocated
Allocation of costs:
1. G & A Expenses
2. Other expenses
Segments serving contracts and other segments
Direct costs:
Source: Incurred
Allocation: Direct allocation to contracts
Indirect costs:
Sources of costs:
1. Incurred
2. Allocated
Allocation of costs:
Cost for serving segments
Costs for contracts
1. G & A expenses
2. Other expenses
Segments serving other segments
Sources of Costs:
1. Incurred
2. Allocated
Allocation of costs
Causal factor
Causal factor
Cost input basis
Final cost objectives (contracts)
Cost components
1. Direct costs
2. Indirect costs
a. G & A expenses
b. Other expenses
Total allowable costs
Fee. Mark-up
Contract price

CASB also uses the term 'causal or beneficial relationship' rather loosely. It has been discussed earlier that, although causal relationship implies a certain degree of beneficial relationship, it is difficult theoretically and empirically to establish any beneficial relationship between the incurrence of the cost and the result it generated. Upon close scrutiny, one will realise that the Board tends to favour the causal relationship, as is evident in the allocation of general and administrative expenses. The Board explicitly rejected those bases which are dependent on the cost of goods sold or revenue of the receiving activities in favour of a cost input base representing the total activity of the segment performing services.

Apart from the rather loosely used term 'beneficial relationship', we can see that the CASB has a distinct hierarchy of allocation bases. They are, in the order of the Board's preference, (1) observable physical connection for direct costs, (2) causal factors for indirect costs whose relationship to receiving economic activities can be measured on some objective basis, (3) somewhat arbitrary causal factors for indirect costs without objectively measurable relationship, and (4) obviously arbitrary allocation formula.

Can we make the matching concept acceptable?

The problem of matching and the allocation issue are essentially two sides of the same coin. Critics of the matching concept argue that the costs cannot be related to revenues realised within a specific period on the basis of some discernible positive correlation. Opponents of accounting allocation maintain that calculations of how much benefit or effect has been contributed by an individual cost input are arbitrary because of interaction. It seems apparent that the criticism is directed at the fallacy that there exists a positive correlation between input (cost) and output (revenue) and they must be matched in the determination of periodic income. The crux of the problem, as mentioned earlier, is that the matching concept does not provide a defensible basis of associating cost with revenue. A logical solution, then, is to select the acceptable allocation basis.

Since allocation bases which are dependent on beneficial relationships and ability-to-bear are arbitrary in nature, we must rely on causal and physical relationship as the guide in associating cost with revenue. One possibility is as follows:

1. If physical relationships are observable, use them as the allocation bases.
2. If causal relationships can be explicitly established via quantitative correlation analysis, use them as the allocation bases.
3. If causal relationships cannot be explicitly established as in (2), but can be implicitly established via qualitative causality, use them as the allocation bases.
4. If no discernible relationship can be established, do not allocate. If allocation is absolutely necessary, a uniform base must be used.

The use of physical or causal relationships is easily defensible and unambiguous. Since these relationships are not dependent on the effect of the expenditure, which could vary from time to time and from one unit to another unit because of the change in productivity and other factors, they are free from the interaction problem. Furthermore, they can be objectively verified and are able to divide up what is available to be allocated (Arthur Thomas's Requirement No. 3 for allocation).

It should be noted that in Case 3 listed above, the allocation result is defensible on logic and knowledge of operations only, not on any quantitative ground. If one insists on quantitative evidence, then Case 3 should be treated as a part of Case 4. However, the point remains that the qualitative causality should be used as a guide in selecting the uniform allocation base should it become necessary to allocate the cost involved. If all allocation methods are equally arbitrary, other things being equal, we should choose the one that is the most logical. The point to be emphasised is that, unless generally accepted alternative allocation methods are objectively defensible, allowing arbitrary variety will result in misleading accounting numbers with an aura of objectivity that is completely unjustifiable. If we must allocate in Cases 3 and 4, the elimination of arbitrary variety and the use of uniform procedure will insure comparability of accounting data.

Since accountants rely on a time period to measure value flows and reflect a firm's financial condition and results of operations, we must use time period as well as physical items and economic activities as the basis for associating cost with revenue. This is consistent with Paton and Littleton's original conception of matching in that either the segment of product or unit of time can be used as the means of associating cost with revenue. Accounting transactions are replete with examples that expenditures are more closely related to time periods than to revenues realised during those time periods. Rental payment, for one, is caused by the lapse of time, not by the revenue realised. Ignoring time periods in the attempt to associate costs with revenues is to ignore the economic reality which accounting purports to reflect.

The FASB in Statements No. 2 and No. 5 explicitly avoided using the term 'matching' but did not formally abandon the concept either. The conclusions reached in these two statements, however, seem to be consistent with the allocation guideline proposed in this paper. Take Statement No. 5 for example: the Board concluded that all R & D costs, other than reimbursable costs performed for others under contract, shall be charged to expense as incurred. Empirical evidence has not been able to establish a direct relationship between R & D costs and specific future revenue.[23] Nor can we associate the R & D costs with a specific number of time periods causing the expenditure. Since no causal relationship can be established, the Board was correct in the expensing of R & D costs. As to the exception in Statement 5, a causal relationship is evident. Therefore, it is logical to allocate those costs associated with a reimbursable contract to the contract awaiting future matching.

Conclusions

One of the paradoxical aspects of accounting theory development is that many abstract and vaguely defined concepts have wide acceptance, yet the very reason for the wide acceptance is that the concepts are abstract.[24] They become more useful, but more a source of disagreements, as they are made more concrete. For example, relevance and materiality are indisputable features of accounting, but what information is relevant or material depends on how one views relevance and materiality. By the same token, Kenneth Most observed that, in the debate on accounting for pre-production costs in the petroleum industry, all participants are for matching but will not agree on anything else.

The FASB's explicit refusal to use the term 'matching' is simply to shelve the issue without solving it. It is manifested by the Board's failure to mention the matching concept in its *Exposure Draft* after the concept was referred to as Issue No. 1 in the initial *Discussion Memorandum.* Matching grew out of the logical interpretation of accounting allocation. It is the conceptual underpinning of inter-period as well as intra-period allocations. The fact that some allocation methods are arbitrary does not mean that the matching concept is useless. Without the matching concept, all allocations, no matter how objective, are theoretically unjustifiable. A logical solution is to make the concept more acceptable at the operational level.

In this paper, it has been argued that the acceptance of an operational concept of matching hinges on the ability of the profession to define what the acceptable bases for associating costs with revenues are. This paper presented one possibility, patterned after the CASB's allocation model. The problem involved is essentially similar to that of relevance and materiality. The absence of an agreed materiality guideline does not mean materiality should be rejected. By the same token, we cannot discard the matching concept simply because it does not tell us how to match. However, it does pinpoint what needs to be done to make these concepts more useful. Several attempts have been made by the FASB to develop an acceptable guideline for the materiality concept. It seems to be fair to say that the Board should also organise a systematic research effort to tackle the allocation and matching issue.

Finally, one easily gets the impression from the existing accounting literature that the matching concept implies historical cost accounting. Paton and Littleton introduced 'matching' and 'costs attach' in the same chapter of their monograph, giving the impression that the two are inseparable. In fact, the matching concept can exist independently of the historical cost basis. The 1964 AAA Concepts and Standards Research Study Committee on the matching concept recommended the replacement value basis for matching purposes.[25] A similar position was taken by the Accounting Standards Steering Committee when this influential UK accounting group issued *The*

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[23] See Orace Johnson, 'A Consequential Approach to Accounting for R & D,' *Journal of Accounting Research,* Autumn 1967, pp. 164–172.

[24] See FASB Conceptual Framework Project Part II.

[25] See footnote 16.

Corporate Report.[26] ED 18, 'Current Cost Accounting' reflected the same position.[27] The Sandilands Committee, recommending the use of the 'value to the business' concept to replace the historical cost concept, viewed its new valuation concept as not inconsistent with the matching concept.[28] It should become clear that if we do not insist that costs mean acquisition costs, the concept of matching, which is deeply embedded in modern accounting theory and practices, would not be as useless as its critics view it.

Acknowledgements Support from the Office of Naval Research as part of the Foundation Research Program at the Naval Postgraduate School is gratefully acknowledged.

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[26] The Accounting Standards Steering Committee, *The Corporate Report* (London: The Institute of Chartered Accountants in England and Wales, 1975), p. 73.

[27] Accounting Standards Committee ED 18—'Current Cost Accounting' (November 1976). See also Edward Stamp, 'ED 18 and Current Cost Accounting—a Review Article,' *Accounting and Business Research*, Spring 1977, pp. 83–94.

[28] Committee on Inflation Accounting, *Report of the Inflation Accounting Committee* (September 1975).

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Book Reviews

An Introduction to Financial Accounting Theory. *Scott Henderson and Graham Peirson.* Longman Cheshire, 1977. vi + 154 pp. £5.95.

In the authors' view there is general agreement that undergraduate degrees in accounting should include a course on Financial Accounting Theory. This book represents their ideas on the contents of such a course. They believe it will give students an appreciation of the continuity and vitality of the accounting profession and alert them to the significance of accounting research.

Chapter 1 explores the nature of theory. A theory is defined as a confirmed or validated hypothesis. Consequently an accounting theory is viewed as a confirmed or validated hypothesis about accounting. Three types of theory are identified: empirical (which relate to matters which can be experienced), formal (which deal with the relationships between statements) and mixed (which contain both formal and empirical elements and seek either to explain or prescribe). Accounting research is considered to be the processes by which hypotheses about accounting are tested.

Chapter 2 sketches the history of the development of accounting theory. This is seen as falling into five periods. These are the development period (pre-1494), the pre-theory period (1494–1800), the general explanatory period (1800–1955), the general normative period (1956–1970) and the specific empirical period (post-1970).

The remainder of the book builds on this historical foundation. Chapter 3 deals with general explanatory theories and is devoted to a discussion of Paul Grady's *Inventory of Generally Accepted Accounting Principles for Business Enterprises.* This work is selected as being the most complete example of theories of this type, that is, work devoted to explaining, rationalising, justifying and codifying contemporary accounting practice.

Chapter 4 looks at the general normative period and shifts the emphasis from what is to what ought to be. The ideas of Sweeney, Edwards and Bell, and Chambers are described and illustrated. The last period identified (the specific empirical) is tackled in chapter 5 where some of the work relating to the income smoothing hypothesis, the efficient market hypothesis and the sophisticated investor hypothesis is explored. Finally chapter 6 contains an assessment of the impact that accounting theory has had on accounting practice and concludes, rather depressingly, that it has been small.

The book achieves its basic objective of showing Financial Accounting to be a developing and challenging discipline. It is well written and researched. Its profusion of references will alert students to the scope of accounting scholarship. It contains many competent summaries of major recent works which will be invaluable to those with meagre library facilities. But it is ambitious in its scope (we all have our own ideas on what such a course should contain) and some unavoidable blemishes flow from this.

For example, the relevance of some of the material will depend on degree course structure. Students who have followed a course on logic and scientific method may find chapter 1 somewhat shallow and repetitive. Those who have a good grasp of statistical method may take a similar view of the section on modern empirical works. Others may become slightly irritated by the structure of the book. A good deal is relegated to four appendices and this tends to interrupt the flow.

On a more fundamental level some teachers of Financial Accounting Theory may be uneasy about the omission of any substantial reference to economics. 'Value' and 'Income' (the substance of Financial Accounting) are, after all, economic concepts and the work of economists in these areas has much to contribute. This omission may go some way to explaining why the book, on occasion, seems to contain too much by way of description and too little of the authors' own views. The chapter dealing with normative theories, for example, suffers from this. It is surely the case that the excitement of Financial Accounting lies in reaching a balanced view of which of several schools of thought deserve support. Our authors do not take us down this path. They content themselves with a description of the real, physical and adaptive capital maintenance ideas of profit. Their approach, via scientific method, would seem to leave them with little to say on the relative merits of these concepts whereas an acquaintance with economics enables matters to be taken much further.

The discussion of Grady's work (chapter 3) also seems over descriptive. The authors have trained us in chapter 1 to think of explanatory theories as emphasising the reasons for the relationships between variables. But the *Inventory of Generally Accepted Accounting Principles for Business Enterprises* seems to be what its title suggests—a list. It tells us what accountants do but we are largely left to guess at why they do it. The work selected as the finest example of the general explanatory theories should surely not so neglect us.

The treatment of the general normative theory period of accounting might strike some British readers as lacking in historical perception and balance. The authors consider that this period ended in 1970. However *Asset Values and Inflation* did not appear until 1975. W. T. Baxter's exposition of deprival value, the clear distinction he draws between asset valuation and income measurement and his related masterly syntheses of CPP and CCA ideas seem to merit a place for his work in any considered over view of this area of the discipline. The continuance of the debate on Inflation Accounting may also cast doubt on the terminal nature of 1970.

The chapter dealing with modern empirical work in accounting may be dangerous material to place before students. It smacks too much of a catalogue of what has been done and pays too little regard to how and why it has been done. Without a knowledge of the statistical methods employed (which are not discussed) it is difficult to reach a sensible view of the conclusions arrived at in the studies. Young readers are thus denied an insight into the methodology of modern accounting research and some (although warned) may attach far more weight to particular results than the studies can bear.

The whole of the section of the book dealing with modern empiricism is gloomy. Much of the work described is trite, despised by practitioners and would seem to lead nowhere. It would be a vast improvement if some future line of fruitful development could be identified. Most of us like to take our students to some point on the frontiers of knowledge, but most of us recoil from leaving them with the impression of a bankruptcy of ideas reflecting itself in a defeated repetition of statistical manipulation.

These criticisms are of minor weight and should not be allowed to detract from the solid worth of this work. It is a welcome addition to the literature to which students can be directed and will stimulate much discussion in seminars and tutorials.

University College, Cardiff E. A. French

Business Information Sources. *Lorna M. Daniells.* University of California Press and Center for Business Information, Paris, 1976. xvi + 439 pp.

This book is intended as a guide to the businessman, the student and the librarian. It provides a selected, annotated list of business books and reference sources, with an emphasis on recent material in English. There is a strong emphasis on books published in the USA. The annotations are descriptive rather than critical.

Of most use to British accountants are the chapters on methods of locating facts, basic timesaving sources, locating information on companies, organisations and individuals, 'foreign' (i.e. non-US) statistics and economic trends, investment sources, management, accounting/control and taxation, computers and management information systems, corporate finance and banking, and international management. The final chapter makes suggestions for a basic bookshelf.

The author, who is head of the Reference Department, Baker Library, Graduate School of Business Administration, Harvard University, comments that 'Probably no function of business has such a prolific literature, written over as long a span of history, as does the field of accounting... There are probably more professional journals published on accounting than on any other business area' (pp. 179 and 189). It is a weakness of the chapter on international management that international accounting is not covered.

Also available from the Center for Business Information (7 rue Buffon, 75005 Paris) are a number of 'European Business Information Source Guides' including one on Accounting and Finance by Ian Dalzell.

University of Exeter R. H. Parker

Spicer and Pegler's Practical Auditing, 16th Ed. *R. S. Waldron.* HFL (Publishers) Ltd, 1978. xv + 492 pp. £6.50.

Practical Auditing in its earlier fifteen editions has always been a tedious book but at the same time painstakingly thorough in those topics covered. As time has passed the topics covered have appeared less and less relevant to either the theory or practice of modern auditing. The editor of the sixteenth edition has attempted to correct this but he has failed in the following significant respects:

(1) There is insufficient discussion of audit evidence concepts and their application. Even in a book on 'practical' auditing it is necessary for the auditor to understand the strengths and limitations of different pieces of audit evidence and the underlying concepts of how the different evidence may be combined to support the audit opinion.

(2) The modern approach to the teaching of auditing is first to develop the audit process, which may be thought of as the steps necessary for a logical selection of audit evidence, and then to apply the audit process to each area of transactions, income statement and balance sheet. This approach is well performed in recent American and Canadian texts, and the beginnings of its acceptance in the United Kingdom can be seen in the Discussion Drafts of Auditing Standards. *Practical Auditing* goes into the detailed audit steps with insufficient prior discussion of the audit process as a whole.

(3) In general, the audit process may be regarded as the following:

1. Determining audit objectives
2. Acquiring knowledge of the business
3. Acquiring and interpreting population statistics, including analytical review
4. Use of the inter-relationship between accounts
5. Ascertainment and evaluation of internal control
6. Performance of compliance tests
7. Performance of substantive tests
8. Review of financial statements.

In particular, *Practical Auditing* gives insufficient consideration to steps 1 to 4 of this audit process.

(4) The determination of audit objectives is of paramount importance for audit planning and the interpretation of audit evidence. For transactions areas they may be thought to include validity, authority, completeness, accuracy of valuation, classification, cut off, whereas for balance sheet areas validity and authority may be replaced by existence and ownership, with the objective of proper disclosure being added to the list. Throughout the discussion of detailed tests it should be made clear to the reader to which audit objectives each detailed test contributes. There is no attempt in *Practical Auditing* to approach the subject of detailed testing in this way and yet this is the approach increasingly adopted by the large professional firms. In the reviewer's experience the approach works both in terms of improved student understanding and interest. The problem is most clearly seen in Chapter 3 which is entitled 'auditing procedures', where the example given of an internal control questionnaire is a list of questions without any attempt to cluster the questions under relevant audit objectives.

(5) Chapter 13 is entitled 'divisible profits and dividends' and much of the aged case law covered must be of doubtful relevance today.

(6) Chapter 15 covers the use of sampling techniques including statistical sampling. However, there is insufficient appreciation given of monetary unit sampling techniques, which in practice have proved to be a most useful audit tool.

(7) Chapter 16 covers the audit of electronic data processing systems. However, there is insufficient discussion of the practicalities of using an integrated test facility or a computer audit package.

(8) The main points introduced by accounting standards (up to and including SSAP 13) are related in Chapter 18. In this reviewer's experience this subject is better dealt with by case study of the problems which have been encountered (and there are plenty of examples to choose from) in practice by directors in the application of accounting standards and by auditors in appraising the worth of accounting policies adopted by directors.

(9) The consideration given to the changing audit environment is inadequate and misplaced as the last, rather than an early, chapter of the book. In particular, there is insufficient consideration of such topical matters as ethics, independence rules, audit committees and the implications of Department of Trade Inspectors'

Reports. Throughout the book, there is an over-emphasis on the legal position of auditors, and too little recognition of social and political pressures.

(10) There are insufficient examples of audit reports and discussion of reporting problems. In this connection there is insufficient discussion of the difficult concept of materiality and of the practical difficulties of reporting where there is non-compliance with accounting standards.

The introduction of auditing standards along the lines of the discussion drafts will necessitate this book being revised yet again in the near future. Frankly, the task is not worthwhile. The next edition of *Practical Auditing* should be completely rewritten from first principles.

Institute of Chartered Accountants of Scotland
D. Hatherly

Management Decision Support Systems. *Andrew M. McCosh and Michael Scott Morton.* Macmillan, London, 1978. £10.

What are management decision support systems and how do they differ from management information systems (MIS)? McCosh and Morton draw the distinction between 'structured' and 'unstructured' decisions and argue that almost all MIS activity so far has taken place in the area of structured decisions—specifically in the operational control area. They consider that only a few working systems are in the structured management control or strategic planning area; and that most of the opportunities for improving the 'effectiveness' as opposed to the 'efficiency' of an operation are in the area of unstructured decisions. In particular, they argue that in the grey area between the structured and the unstructured is an important class of problems where the system alone, or the manager alone, does not make as effective a decision as the two in combination. These man/machine systems McCosh and Morton call decision support systems (DSS), and it is on these systems and the semi-structured problems for which they are appropriate that their book is focused.

Thus, the principal focus of the DSS point of view is to look at the organisation in terms of decisions that must be made, the realisation of this focus being the development of a model of the decision process that can be supported or automated. The authors see the requisite skills as: model building based on close interactions with management; structuring and formalising the procedures employed by managers; and segregating those aspects of the decision process that can be automated. To realise the potential decision support, McCosh and Morton identify a set of components that must be put together. The first and most important element is the manager, who is intimately involved in the decision process. The remaining four components of the system are models, a computer, a communication device to permit the manager and the computer to work together, and a source of raw data upon which the manager and the computer can draw when necessary. The bringing together of these components is very frequently in the form of a computer-based interactive decision model to be used by the manager.

Having examined the fundamental characteristics of decision support systems in Chapter 1, the next three chapters are devoted to expanding upon the concept of modelling to a further exploration of the relevant technical developments, and to a discussion of the major components in the process of designing DSS. These are followed by four examples of working DSS in the financial area: profit planning, budgeting, financial analysis of merger opportunities, and pricing decisions. Having had limited involvement in the development and use of DSS, the reviewer found the three chapters concerned with development and design interesting but on some occasions repetitive. This led the reviewer to question the appropriateness of the early chapters to the intended audience. The main audience towards which the book is directed is management. The reviewer suspects that many managers will find the book a little too academic and long-winded for their liking. However, it is a book which should be read by budding and qualified accountants and by undergraduate and postgraduate accounting and business studies students. The case studies do illustrate the potentialities of DSS in the financial area without becoming bogged down in technicalities.

In Chapter 9, McCosh and Morton discuss an important limiting factor to the successful application of DSS: the organisational implications. In their concluding chapter, as well as providing a summary and predictions, they emphasise the rules they have found to be of greatest importance in the development of decision support systems.

Though some of these rules are not new, they are well worth stating in this review:

1. Keep it simple,
2. Tackle significant problems,
3. Don't let the computer people design the model,
4. Don't let the operations research staff design the model,
5. The manager who is responsible for the subject should be the person who designs the model,
6. Use the staff people to make the model,
7. Test the model and adjust it, and
8. Regard the replacement of models by better ones as evidence of vitality, not of earlier errors.

An interesting and relevant book; well worth reading.

Loughborough University John Sizer

Auditing Today. *Emile Woolf.* Prentice-Hall International, 1979. xiv + 497 pp. £7.95 paperback.

I am pleased to review this book by Emile Woolf as he has contributed substantially to auditing education over the years. It is fair to say that this contribution is fully reflected in the text. As such, it has obviously been written after considerable thought and experience, and is therefore not one of the growing number of 'instant' books which are written by accountants before they have had time to clarify their thoughts and rigorously test their material. On the other hand, whether it is entirely fair to state that *Auditing Today* is the first British text on auditing to take account of modern developments is debatable.

Mr. Woolf has attempted to produce a text which realistically mixes the conceptual with the practical although, from its content, it is obvious that it will be more relevant to the professional market than to the strictly academic one. The time devoted to auditing topics in degree courses is sadly small, and the detail in this book takes it far beyond the typical auditing syllabus in a degree course. Nevertheless, university and polytechnic students of auditing should find it of some use.

The content of the book is wide ranging—a historical beginning (much too brief); a good section on professional ethics (again, arguably brief); a review of the audit process from beginning to end (including systems audits, internal control reviews, flow charting, sampling, final accounts reviews, and the audit report). Much of this is conventional in its nature and I wonder what some of the larger professional firms would make of it. It is sound but whether it truly reflects practices now being examined and implemented is a matter for further research. The text is well written, well constructed, and flows relatively easily—although I found it was interrupted somewhat by the inclusion of fairly voluminous illustrations and excerpts from professional statements.

The end of the book is rather like the curate's egg. There is a section on the auditor and the law (much too brief); one on the problem of auditing computerised accounts (arguably too long in relation to other parts of the text); one on 'what are profits' covering matters such as inflation accounting (much needed in auditing books and most relevant); and a final one on current issues (most of which could have been placed earlier in the text in appropriate places).

There are only two chapters which give additional reading references and, with a book of this size, there could have been included examination questions and discussion topics which would have helped to relate the text to its market.

Overall, this is a good book, and a reasonable buy at nearly £8. I am sure it will sell well and I would hope that opportunity will be taken to refine its content further. This is an enormously difficult book to write, and it will need changes in later editions. Particularly, I feel that the following should be examined:

1. The balance of the 'conceptual' and the 'practical'. This has got to be carefully handled if sales are to be made in the markets aimed for and, at the moment, I feel the two aspects have not been integrated sufficiently into one body of knowledge.
2. More attention be paid to audit practice tomorrow rather than just to that of today. After all, students are concerned with auditing tomorrow.
3. Adequate additional reading be supplied at the end of each chapter.

Meanwhile, the text should be used in auditing courses, and is recommended to lecturers for their consideration in this respect.

University of Edinburgh T. A. Lee

Survey of Published Accounts, 1978. Institute of Chartered Accountants in England and Wales, February 1979. 248 pp. £10.95; and **Survey of Company Reports.** *C. J. Platt.* Wilton Publications, November 1978. xiv + 125 pp. £17.50.

This is the tenth *Survey of Published Accounts* (SPA) and the first *Survey of Company Reports* (SCR). The latter is written by C. J. Platt who is also acknowledged in the preface to the former as being responsible for *its* preparation.

Many of us who are familiar with SPA have found it useful over several years and are pleased that it continues to be produced with improvements and additions each year. Its opening sections are especially good this year. The first discusses recent developments including EEC Directives, the 1978 Companies Bill, new accounting standards, and auditing standards and guidelines. The second discusses the extant standards (both ASC and IASC), possible future standards and compliance. Some of the other early sections are also of great interest, for example that on inflation accounting practices over the last few years and that on recent and proposed extensions of corporate reporting. However, most of the book very sensibly maintains consistency from year to year in its discussion and analysis of practices relating to items in the profit and loss account, balance sheet and so on.

SPA seems to be very accurate in general in its summaries of present requirements, though there is a very misleading definition of the *temporal method* of foreign currency translation (p. 50). Perhaps the least useful parts of the book are reports which side-track us from the overall impression that the book's survey of 300 companies gives us. This comment naturally leads on to a consideration of the other book.

SCR intends 'to depict some of the more interesting features of accounting and reporting practices adopted by listed companies'. It starts by listing the 660 companies whose reports are studied (8 pages), and then has an introduction and a selection of 41 reports which are deemed to have 'wider than usual standards of accountability' (3 pages). There is then a section on the pressures for extra disclosure (2 pages). This is much briefer than that in SPA and, perhaps because of the date of publication, contains no details on the EEC Fourth Directive or the 1978 Companies Bill.

The next section (13 pages) is a commentary on the survey which follows. This commentary lists the industrial categories into which the companies in the survey are split and comments on the various aspects looked for in each company's report. For example, the information about stock valuation includes very brief details about what practice should be and then only one quantified fact about what practice is; that is the proportion of companies showing stock by category. This is much less detailed than SPA, which deals at some length with SSAP 9, IAS2, the Fourth Directive and the 1967 Companies Act. SPA also quantifies its survey of practices on the subjects of categorisation of stocks, bases of valuation, disclosure of methods used to calculate historic cost, treatment of overheads, and long-term contracts.

Returning to the new SCR, its summaries of practice are also brief for earnings per share, R & D and depreciation; though slightly longer for goodwill, revaluations, deferred tax and inflation accounting. However, in each case, SPA is much more detailed. Nevertheless, SCR does comment in greater detail than SPA on statements of short-term borrowings and transactions in foreign currency.

The main feature that SCR has above SPA is 99 pages of details of reporting practices of each of the 660 companies, listed by individual category. This is preceded by perhaps the most useful section in the book (3 pages) on the differences in reporting by industrial category. The variation in the treatment of R & D, deferred tax and inflation accounting is very interesting, though it may be explained by the absence of certain activities in some industries or by the difference in the average size of companies by industry.

The main point of SCR, the 99 page list of details, was not very illuminating for me. The sort of detail given, like whether the information provided by a company on its depreciation policy was 'precise' or 'vague', resembled the latter rather than the former. If the reader wanted to know about a particular company's practices, SCR would not be detailed enough and that company's actual report should be obtained. And for most other purposes such listings of details could hardly be useful.

For me, then, the continuing series of SPAs provides a very useful summary of the rules of financial reporting and the practices of large industrial companies. SCR covers these areas far less well and, although it provides much extra 'detailed' information by company, this is transitory, fairly uninteresting and very expensive.

University of Exeter C. W. Nobes

Financial Accounting Theory, *M. Harvey and F. Keer.* Prentice-Hall, 1978. xi + 179 pp. £3.95.

The jacket of this book states that Harvey and Keer's book is the first written specifically for professional examinations in accounting theory. In addition, it is said to prepare students for analysis, comment and essay questions, as well as computation; to be suitable for all countries following British practice; to analyse relevant accounting standards; to be illustrated with examples drawn from actual company reports; to relate theory to everyday practice; and to give questions and discussion problems at the end of each chapter.

The book certainly does comply with the above description in some respects. This reviewer, however, found it difficult to judge whether or not the book does satisfy (as it claims) the students' needs for the examination of the Association of Certified Accountants, Institute of Cost Accountants and the Institute of Chartered Accountants (the reviewer admits to being rather confused by the anonymity of the latter body!). As far as preparing students for analysis of situations or examination questions is concerned it is not easy to say how far the book really achieves this objective. In many aspects the book is disappointing in merely skimming over conceptual problems although the requirements for the examination syllabi outlined above may, in fact, have precluded a deeper analysis of issues and concepts from being attempted. The book certainly considers accounting standards, although in some cases to a far greater extent than is necessary. It also gives examples drawn from company reports but, as in the case of standards, the examples given are excessive. Of the 174 pages of the book no fewer than 16½ are taken up by company report examples, 19 by reproductions of standards, and a further 17 by summaries of standards or company law and Stock Exchange requirements. Little analysis is done of the accounting presentations and much of the considerable space devoted to reproducing the standards is probably wasted as the standards are easily obtainable and presumably will have been studied by the students for whom the book is written.

The book, in essence, is derivative. It tends to reproduce without critical comment. For example, while it lists within the text much of the Sandilands Committee's conclusions, summaries of SSAPs and quotes from *The Corporate Report*, it devotes very little space to original analysis or criticism. In some respects, it is possibly the title which is the major problem with this book. In a book entitled *Financial Accounting Theory*, one would expect far more than simply six chapters concerned with firstly, methodology in financial accounting theory; secondly, concepts of accounting; thirdly, income, value and capital; fourthly, the depreciation problem (which sits rather uneasily in the middle of the book); fifthly, income and value during periods of changing price levels; and finally, the movement towards accounting standards.

The theme of the book is that accounts are neither intended nor designed to meet today's demands and, consequently, deficiencies found in financial statements are hardly surprising. The authors develop this point by arguing that if accounts are to be improved then principles must be reconsidered and the conventions of traditional accounting should be examined critically. If, as the authors suggest, the Accounting Standards Committee is to undertake this task, then obviously in the future, when the ASC is choosing between a variety of possible ways of accounting for particular transactions, reference should be made to an underlying theory.

The authors proceed to outline the construction of a theory and argue that the essence of financial accounting theory should be the explanation of observed phenomena—the measure of the theory's success could be found in its ability to predict future events. Therefore, the authors argue, in formulating a theory of financial accounting it has to be decided, first, who wants to make the prediction and, second, what they want to predict. In answer to the first part of the question the authors generally rely on the *The Corporate Report's* categories of types of user groups. As far as the second part of the question is concerned the authors argue that the accounting conventions selected in the production of accounts must ensure that an accurate reflection is made of the company's success or failure in terms of its ability to produce positive net cash flows in the long run. Therefore, in examining various theories of income and value the authors suggest that the critical question to be answered is whether the particular measure under consideration aids the prediction of the organisation's long-term cash generating ability.

So far then, so good. The authors now briefly pass over the problems of semantics in one single paragraph—in a book on accounting theory one would have thought a somewhat longer explanation of the problems of communication would be necessary—and then simply outline a framework of accounting. The framework is developed in the second chapter where concepts underlying financial accounts are considered. Bierman and Drebin's classification of accounting principles is used, presumably to create a framework, but instead of analysing this particular accounting structure in detail the authors move on to discuss briefly the acceptability of the accounting framework and to examine practical developments in the evolution of such a framework—the latter being nothing more than a brief summary of SSAP 2.

Having discussed this particular standard, the authors turn to Income, Capital and Value. The theories of Fisher and Hicks are discussed, albeit not at length, and are compared; various valuation methods are outlined and the deprival value formulae are presented. The accounting concepts of income are then compared and contrasted with the Hicksian approach with reference being made to accounting standards.

Unfortunately instead of continuing this interesting theme the authors then devote a chapter to a discussion of depreciation. It is not at all clear from the text why depreciation merits a chapter to itself. Depreciation is after all only one aspect of the matching problem and to pick one particular accounting principle and to devote a considerable part of a book on accounting theory to it seems to create unnecessary imbalance. In the introduction to the chapter the authors do mention the system of cash flow accounting which has many proponents in the academic community but the cash flow v accrual accounting debate is omitted and instead the authors concentrate on the more mundane task of illustrating the treatment of repair costs, the calculation of conventional depreciation charges, prevalent misconceptions on depreciation and, perhaps inevitably, conclude by outlining the UK standard on depreciation (SSAP 12) and its international equivalent.

The fifth chapter is concerned with the effect of inflation on accounts and here the authors tend to adopt a historical approach rather than an analytical one. A considerable part of the chapter is concerned with the Sandilands Report and ED18 and while the concept of operating profit and problems associated with monetary items are discussed, there is little analysis or comparison of theories of accounting for price level changes. The chapter is somewhat disappointing as too much of it is concerned with details of Sandiland's terms of reference, the Committee's methodology, conclusions and recommendations and then with a repetition of much of this by the adoption of the same treatment for the discussion of ED 18. The Hyde recommendations are dismissed in a page and a half—no analysis whatever is made of the provisions of ASC's most recent pronouncement on accounting for price level changes. The gearing adjustment, for example, is simply stated as being felt necessary as it makes some adjustment for monetary items. The philosophy behind this adjustment and the financing adjustments proposed by Gibbs and by the Richardson Committee are not mentioned at all.

The final chapter entitled 'Towards Accounting Standards' looks at the first part of the question posed by the authors in Chapter 1 in discussing the formulation of a theory of financial accounting, namely, who uses accounts and what are their objectives? The common users outlined by the *Corporate Report* are mentioned but little critical analysis is done of the users' needs. For example, with long term debt holders the authors state that this class of user is perhaps reasonably well served by the published financial statements currently issued since as these statements are being produced with the stewardship function in mind they are prepared in accordance with the concept of prudence. Yet would not the net realisable values of assets be an additional benefit to this particular group, and indeed, to most creditors? Instead of discussing user needs in greater depth, however, the authors proceed to consider the legal requirements and presentation of accounting information (which takes one paragraph), disclosure developments and published financial statements, and finally conclude the chapter by comparing international approaches in setting accounting standards. The approach in the United States is, however, dismissed in two paragraphs and the existence of the FASB is only mentioned in the last sentence of the second paragraph. As far as the UK is concerned the authors are content to outline the Statement of Intent on Accounting Standards in the 1970s and a basic categorisation of accounting standards originally devised by Professor Edey. SSAP2 is then considered (again) on the basis that it set the ground for accounting in the United Kingdom and is worthy of examination. The authors then ostensibly look at international accounting standards but in fact simply outline the requirements of IAS1, 'Disclosure of Accounting Policies', which, of course, is the international equivalent of SSAP2. The authors stop short of discussing the implications of international standard setting.

This book is not a book on what the reviewer would term accounting theory. It fails to discuss in sufficient detail the communication problems, the problems of income and value measurement, and the accounting framework. In saying this the reviewer is perhaps being unfair as he is not at all certain of the requirements of the examinations for which this book has been written. It must be said, however, that for students with any university or polytechnic training in accounting theory this book would be of a most elementary nature. It would appear to be only suitable for those who have had no previous instruction in accounting theory and who wish to obtain a few basic insights into the theoretical basis of the discipline.

Institute of Chartered Accountants of Scotland — David Tweedie

Related Party Transactions: Current Practices in Canada, the United Kingdom and the United States. *Accountants' International Study Group, 1978.* 8 pp. £1.75.

This useful booklet is the last of the excellent series of studies by the AISG. The booklet follows the format of its predecessors, and it is admirably concise in the way it reviews the present reporting practices in the three countries.

The importance of disclosing information relating to transactions was highlighted in the SEC Accounting Series Release No. 153, which states that 'fundamental to financial reporting is the assumption that financial statements reflect the results of arm's length bargaining by independent parties'. The study points out that a definition of related parties includes, in addition to a parent or a subsidiary company;

A company controlled by the same parent company or by the same person or persons,
An individual or a company owning a significant percentage of any class of equity shares of the reporting entity,
A company in which the reporting entity owns a significant percentage of any class of equity securities,
The management of the reporting entity, including directors, officers, and management companies.

The study implies that whilst the disclosure of related party transactions is (following the issue of Statement on Auditing Standards No. 6) most highly developed in the United States, increasing attention is being given in all three countries to the question of the economic relationship between entities.

The study suggests that if a company, in any of the three countries, depends heavily on a third party (such as a supplier), and if this heavy dependence might affect the viability of the company as a going concern, this dependence may call for disclosure. The study also comments that International Accounting Standard No. 5 (which has not yet been published in this country) requires significant intercompany transactions to be disclosed as part of the income statement.

The real problem concerning transactions between related parties is when the transactions have taken place at amounts that are different (because of the relationship between the parties) from the amount of similar transactions between unrelated parties. Transactions of this kind raise the question of whether they should be accounted for on a basis that reflects their fair values, and, if so, how hypothetical fair values should be determined. It may be that no comparable arm's length transactions have taken place. The present position is that these transactions should be disclosed without adjustment, but some people question whether this is the correct approach.

The study also mentions briefly the audit considerations of related-party transactions. It makes reference to the US auditing standard which permits auditors to include a paragraph to emphasise a matter in an unqualified report. It gives, as an example, the case when 'the entity has had significant transactions with related parties'. This is also the approach in the British Auditing Practices Committee's discussion draft on the audit report.

The study concludes that when transactions between related parties have taken place, they should be accounted for at the amounts at which they were effected. Financial statements should disclose:

The nature of the relationship.
A description of the transactions, including the amounts involved.
Amounts due to or from related parties, and, if not otherwise apparent, the terms and the manner of settlement.

This high standard of disclosure is rarely achieved in the UK. For that reason, this booklet is to be welcomed as a contribution to the current trend for increased information to be included in financial statements.

London — Bryan G. Blackborn

Accounting and the Management of Socialist Enterprises in Poland and Romania. *Sarah and George Staubus.* University of Lancaster, 1977. ICRA Occasional Paper No. 16, vi + 76 pp. £2.50.

This paper presents original material obtained by the authors on a research visit to Poland and Romania. Their aim was to study the accounting function in these two socialist countries, by means of interviews and observations. The visit was made possible by the International Research and Exchanges Board. The authors interviewed a considerable number of people, not only in academic institutions, but also in government agencies and in operating enterprises. In Romania, their time was spent chiefly in Bucharest, but in Poland they visisted Krakow, Wroclaw and Lodz, as well as Warsaw.

The paper has a short introduction covering the type of question the authors were interested in, the method of approach they used and the range of people they interviewed. The main body of the paper is divided into two parts, the first dealing with Romania, the second with Poland. Each part deals with three main topics: the education of accountants, the economic system, and the function of accounting. The summary concludes by emphasising the role of accounting in these countries, the changes since 1970 and the likely effects of current trends, and the points of similarity between accounting in Poland and Romania, and accounting in English-speaking countries.

The paper provides a wealth of information about the education, training and career prospects of accountants. Accounting is very much an academic discipline in both countries, but considerable weight is given to practical training. In Romania, students spend part of their time working in operating enterprises or in government agencies, and carry out some accounting work within their academy itself. In Poland, computer usage and applications comprises a major part of the syllabus, and the universities are actively engaged in computer-based consultancy work for enterprises and government agencies. In both countries education is moulded by the requirements of the planning system. The Polish emphasis on computers reflects the planners' aim of achieving full-scale mathematical planning. The Romanian emphasis on work experience, which is backed-up by specialisation in a chosen sector of the economy, reflects a situation where the typical accountant stays with one enterprise for much of his working life. Specialisation, by improving technical expertise, is particularly useful in a planned economy where production, rather than marketing, tends to be the most pressing problem for an enterprise.

The paper provides a clear, concise description of the most important aspects of the economies of the two countries, starting with the planning system, and then reviewing the way in which prices are set. The importance of indirect taxes, as components of price, is clearly seen. Details are given of worker remuneration, banking and institutions for economic control in Romania, but these topics are not considered at such length for Poland, although there are some interesting observations on the 'dollar economy', that is, the widespread use of the dollar within the country. The differences between the countries are well brought out, not only the basic distinction that Romania insists on overall state ownership, and Poland allows the private ownership of land, but also the greater centralisation and rigidity of the Romanian system compared to the Polish one. Poland allows more scope for decision-making at lower levels in the system, and puts considerable emphasis on profit. Terminology itself suggests the difference of outlook; the Romanian term translates as 'benefit', the Polish as 'profit'. But the economic reforms in Romania, as in Poland, have given more weight to considerations of sales and profits, and to economising on use of capital by the introduction of charges. The authors, very rightly, point out that this does not mean a move away from the planned economy. The enterprise is now allowed to keep more of its profits in Poland, but it must still fulfil its part of the Plan, and it has only limited control over its investment programme.

The two sections dealing with the function and uses of accountancy in the respective countries are particularly interesting and useful. The dual role of accounting in the planned economy is well brought out: its indispensability as a source of reliable data for overall planning purposes; its vital function as a means of checking the performance of individual units in the economy. A considerable amount of information is provided on the respective accounting systems: the degree of uniformity and completeness achieved; the means of regulation and control by the respective Ministries of Finance; the structure and drawing-up of accounts; the intervals at which particular types of accounts must be provided; the users of accounts; the method of auditing. Accounting topics covered include cost estimation, including methods of allocating overheads to product costs; depreciation; allocation of profit and depreciation provision; importance, distribution and function of bonuses. In both countries, economic reforms have sought to improve manager and worker motivation by the distribution of bonuses out of profits earned by the enterprise. More charts and examples would have been useful in these sections of the paper, both for easier comparison of these systems with each other, and for comparison with systems elsewhere.

The use of accounting data by the managers of enterprises is discussed in some detail. Greater autonomy for managers has made this more important than hitherto, and both accountants and officials have devoted attention to the problem of providing useful data for managers while still satisfying planning needs. Poland appears to have made more progress in this area, with extensive use of computer facilities to provide information systems to management. In Romania, the degree to which management is served appears to depend more on the initiative of the enterprise accountants.

In conclusion, this paper is a valuable source of information on accounting and economics in Poland and Romania. It should be of interest to anyone wishing to know about how the economic system operates, or how accounting serves the needs of the planned economy. The characteristics, and problems, of uniform accounting systems are well illustrated. Readers will find much that is familiar, and yet be struck by the differences. That the Romanian Ministry of Finance audits enterprise annual 'Balances' will seem understandable, in a planned economy; that Polish enterprises are audited only every two years, and then not by full-time auditors, will seem strange. Many will no doubt ponder over the following facts. In Poland, not only are university economic research institutes run on a profit and loss accounting basis, but several are very successful, and their staff reap the rewards. The Lodz Institute of Light Industry Economics is particularly profitable and has paid bonuses of up to 100% of basic salary. Western academics may, perhaps, wonder if they have something to learn from their socialist counterparts.

University of Exeter Alexandra R. Malcolm

Replacement Cost Disclosures: A Study of Compliance with the SEC Requirement, *M. C. O'Connor and G. Chandra.* National Association of Accountants, 1978.

This 310 page book was produced at the end of the most detailed survey to date of the effect of the Security and Exchange Commission's March 1976 regulations concerning the disclosure of replacement cost information. These regulations, which apply to quoted companies with gross fixed assets and inventories in excess of $100 m, have created a considerable amount of additional work for the 1,000 or so organisations that have had to supply this information in their SEC returns (the 10-K report). Whether the benefits received from the disclosure of this information have exceeded the additional costs incurred is of course debatable, although the interested observer should have a much better idea of the views of internal accountants and external analysts after reading this book.

The book is split into six sections, although three of the sections make up nearly 90% of the material provided. The first major section is concerned with an examination of filed SEC reports, whilst the other two major sections are based on the results of questionnaires sent out to companies and financial analysts. The remaining sections provide case study material and a summary of the results of the various surveys. The accountant who is interested in this subject, but cannot spare the time to read the whole book, could obtain some valuable information by reading the 6 pages of 'research report highlights'. It is important to appreciate, however, that the book is 'strictly descriptive and leaves the formation of whatever conclusions may be appropriate to the reader'.

The SEC's regulations lay down that companies should provide at least four items of financial information based on replacement cost data, i.e. the depreciation and cost of goods sold figures as calculated for profit statement purposes and the plant and equipment (less accumulated depreciation) and inventory figures for balance sheet purposes. Companies are not required to publish this information in their annual report to shareholders, although it is not particularly difficult for an investor to obtain copies of the 10-K report that is submitted to the SEC. From the company's point of view, therefore, the amount of work required is very similar to that which would be required in a full current cost accounting system, although a revised profit figure does not have to be published. According to the SEC the objective of these regulations is 'to provide information to investors which will assist them in obtaining an understanding of the current costs of operating the business'.

The initial reaction of the American business community to these regulations has generally been one of hostility, probably because of the substantial initial costs involved in obtaining the necessary information. In the 610 companies that responded to the questionnaire produced by the authors of this book, the estimated costs of compliance ranged from $15,000 to $360,000 with a typical estimate of about $100,000. It is important to appreciate, however, that these were the costs for the first year of compliance, and British experience has already shown that costs in later years should be very much less.

The measurement of benefits received is naturally a much more subjective exercise. Well over half of the respondents to the company questionnaire felt that the replacement cost data would not be useful for management decision-making or external users. External analysts were also very sceptical about the real value of the additional information; for example, 34% felt that the replacement cost figures would have no effect on investors. On balance, therefore, one gets a very strong impression from this book that at this stage the benefits received as a result of the SEC regulations do not justify the additional costs involved, although ideas may well change as the users of financial statements begin to appreciate the value of the type of information.

For the accounting academic there is a lot of very useful material in this book. In particular, there are 42 pages of comments from respondents concerning their understanding of the meaning of the term 'current value' as used in the context of financial reporting. These comments provide a perfect illustration of the amount of confusion that exists in this subject area, and the end result may be rather disillusioning to those persons who have always contended that the quality of accounting education in the USA is much better than anywhere else in the world. Perhaps I should not comment too much on this subject, however, if the response (p. 201) from one of the industrial accountants is typical of attitudes in the USA—'one problem is that the people in government and universities who seem to like to sit around in their ivory towers and debate such topics as replacement cost usually don't know or understand a damn thing about the real world'(!)

At the end of my rather long reading session I had no doubts that this book had provided me with some useful material regarding the costs and benefits (or lack of benefits) of replacement cost systems, although I was not entirely convinced that I had learnt very much over and above the extremely valuable research report highlights which are provided on pages 3–8 inclusive. A cost-conscious UK publisher would almost certainly have insisted on a drastic pruning operation which could in my opinion have reduced the number of pages to well under 200 without any great loss of effect. Nevertheless, this book does provide us with a valuable insight into the initial reactions of American users to the disclosure of replacement cost information. I am not at all sure, however, whether these initial reactions will be maintained in the future, as there certainly does appear to be some evidence in the UK that an increasing number of quoted companies are incorporating replacement cost data into their management accounting records. Perhaps the issue of the December 1978 FASB exposure draft on inflation accounting will persuade American businessmen and accountants to consider more seriously the benefits that can be obtained as a result of the use of replacement cost data, although this will obviously be a long-term exercise.

University of Exeter P. R. A. Kirkman

The Academy of Accounting Historians. Working Paper Series. Volume 1. Working Papers 1–20. *Edward N. Coffman* (ed.). Academy of Accounting Historians, 1979. viii + 368 pp. $5 members $7.50 non-members.

The working paper series was established by the Academy in 1974 and provides a valuable means of publishing new and continuing historical research for information and comment, individual papers being available free of charge to members as they appear. By the end of 1978 the series consisted of 34 titles. Papers 1–20 are reprinted in the first volume which covers a wide diversity of topics by authors, some of whom are well known whilst others, including some whose papers are based on recently completed research dissertations, are perhaps exposing their ideas and findings in print for the first time. None of the papers emanate from Great Britain despite the wealth of material available in this country and its important contributions to the development of accounting.

Four papers deal with early book-keeping and double-entry. Kenneth S. Most's fascinating paper (3) uses the controversy surrounding the origin of double-entry bookkeeping as the basis for arguing that the kind of invention which is central to the world of the physical scientist is conspicuously absent from that of the social scientist. To this end he presents 'fragments' which have survived from ancient Rome, together with translations by Mrs. Beatrice Sweeney, as evidence which casts doubt on the widely held view that double-entry bookkeeping was an invention of the Italian Renaissance. A paper by Hermann Kellenbenz (7) (translated by R. H. Homburger) seeks to demonstrate that the more complex business activity undertaken in Upper Germany, together with its geographical proximity to Italy, caused double-entry to emerge there at an earlier stage (mid-sixteenth century) than in Lower Germany. Kojiro Nishikawa's paper (10) identifies a number of events that occurred during the second half of the nineteenth century in Japan, marking the partial replacement of an indigenous method of bookkeeping by the double-entry system. Gary John Previts and S. Paul Garner (16) present edited extracts from a series of lectures delivered to the Society of Accountants in France, between 1925–31, by Albert DuPont. The lectures deal principally with early bookkeeping and the origin and dissemination of double-entry. The editors refer to DuPont as someone whose scholarly works have been overlooked by succeeding generations. Certainly his assertion that 'research and popularisation of this subject (the study of the historic development of accounting ideas) is now necessary' was slow to elicit the desired response.

Three papers (1, 5, 14) by John L. Carey entitled 'The CPA's Professional Heritage' concentrate on events occurring between 1925–32 and the plan is to take the survey on to 1972 eventually. Carey was taken on as editorial assistant of the American Institute of Accountants (later AICPA) in 1925 and retired as executive director in 1969. The papers are written from a personal experience viewpoint and contain many interesting anecdotes. Carey's *The Rise of the Accounting Profession*, Volumes 1 and 2, are a fuller treatment of similar subject matter and two papers by Previts (6, 8) comprise a chronological index for these works.

Rosa-Elizabeth Gassman (4) covers the development of auditing in Germany from the Middle Ages to present day in the space of three printed pages plus sixteen footnotes—inevitably she leaves a few gaps.

There are three papers dealing with corporate accounting practices. Richard Vangermeersch (15) uses data from corporate reports published between 1892–1929 as the basis for not entirely convincing criticisms of (i) the current notions regarding intangibles underlying Accounting Principles Board Opinion Nos 16 and 17 and (ii) Carman G. Blough's dissatisfaction with the idea of periodic revaluations of tangible fixed assets, expressed in Accounting Research Study No. 3. Frank R. Rayburn's paper (18), which discusses the changing criteria applied in the USA 1945–1970, in order to decide whether a business combination should be accounted for on the pooling or purchase basis, clearly demonstrates the kind of pressure regulatory bodies operate under when endeavouring to formulate accounting principles. An interesting paper by George J. Murphy (20) uses the corporate reports of a number of Canadian companies as a basis for examining the development of certain selected reporting practices in Canada between 1900 and 1970. The paper contains some useful comparisons with contemporary developments in the USA and Britain and attempts to assess the relative influence of those countries on Canadian reporting procedures. Although one might dispute some of Murphy's findings—for instance his perceived significance of the English Royal Mail case for Canadian practices seems to be overstated in view of the apparent failure of the 1934 Act to tackle secret reserves—this is a very useful addition to the literature on the development of modern financial reporting practices.

Working papers on financial accounting theory are provided by Maurice S. Newman and R. J. Chambers. Newman's paper (11), based on the output of certain eminent accounting historians, consists of a breathless excursion through a succession of civilisations identifying environmental influences which have encouraged the emergence, re-emergence and development of five of the accounting concepts listed by Paul Grady in ARS No. 7. In 'The Development of the Theory of Continuously Contemporary Accounting' (13), written for inclusion in the reprint of *Accounting, Evaluation and Economic Behaviour*, Chambers explains how his interest in the utility of accounting information caused him to examine, expound and subsequently discard a series of valuation theories en route to continuously contemporary accounting which he has since defended against all comers.

A second paper by Vangermeersch (12) contains abstracts of 36 articles, from the 1905–30 issues of *The Journal of Accountancy*, considered to have relevance to present day problems. Marc J. Epstein (9) gives us a full bibliography of English writings on the relationship between scientific management and standard costing. Papers by Homberger (2) and Hans V. Johnson (17) contain illustrations of how historical information can be used as a teaching aid. Finally, Vahe Baladouni (19) argues the case for historical study and puts forward what he considers an appropriate methodological approach.

The book should be considered an essential purchase by all accounting historians and those with an interest in the development of their discipline as a basis for understanding current practices.

University College Cardiff J. R. Edwards

Management of Financial Resources in the National Health Service. Royal Commission on the National Health Service, Research Paper Number 2. 258 pp. £4.00.

The Royal Commission on the National Health Service was appointed in May 1976 with the following terms of reference:

> To consider in the interests both of patients and of those who work in the National Health Service the best use and management of the financial and manpower resources of the National Health Service.

In 1977 Professor Perrin of the Centre for Industrial, Economic and Business Research at the University of Warwick was commissioned to carry out a research project in this field. His report, *Management of Financial Resources in the National Health Service*, is the result of an eight month study coordinated at Warwick with assistance from other academic centres in the preparation of three separate appendices for Scotland, Wales and Northern Ireland. The main body of the report deals principally with England.

The report is over 250 pages long and is intended to take a wide and multi-disciplinary view of the management of financial resources, as acquired through financial allocation and decision making processes. Information was collected by means of questionnaires and interviews from six diverse geographical regions in the United Kingdom. These were: Scottish Home and Health Department, Welsh Office, South Western RHA, Trent RHA, North West Thames RHA and the DHSS (Northern Ireland).

Following the introduction and terms of reference (Part A), the first major section of the report, Part B, outlines National Health Service resource planning and information systems. This is particularly useful to those who have only a scant knowledge of how particular areas of public expenditure are allocated and distributed. Often people fail to understand national constraints and conclude, from a local point of view, that some decisions lead to a misuse of funds. Part C discusses financial management with conclusions and recommendations following in Part D. Part E briefly answers specific questions raised by the Royal Commission.

Both within and without the Health Service much ignorance has existed as to how such a large, and what some would term, unwieldy organisation manages to function. This report outlines the present system and suggests areas for improvement. Information collection needs to be improved, both in terms of quality and timeliness, so that the accounting system is applied effectively to management purposes by combining with non-financial information. Financial management is further impeded by the slowness with which allocations are made by the Government. This is further compounded by successive layers of Health Service management. The report also calls attention to the need for decisions about the scale of less common medical specialities as localised regions or areas of 'self-sufficiency' can be wasteful. In London there are particularly difficult problems involving Teaching Hospitals. The 'Perrin' report is a well presented and readable document and provides a good text book of existing practice, particularly for those not usually versed in the problems of public sector finance.

University of Exeter J. J. Glynn

Accounting and Auditing Guide for United Kingdom Oil and Gas Exploration and Production. *John C. Norton and Donald A. Rowe.* Institute of Chartered Accountants in England and Wales, 1978. x + 326 pp. £14.95.

The authors of this book state that it aims to provide a general introduction to the various accounting practices followed by companies engaged in oil and gas exploration and production activities in the United Kingdom. Accordingly, little mention is made of the 'downstream' activities of the industry, such as transportation, refining and marketing. In choosing to concentrate their attention on the primary stages of oil and gas operations the authors were wise and have succeeded in producing a book of manageable proportions pleasingly short of the weighty tome which the title might, at first sight, suggest.

The presentation adopted follows a logical pattern with the areas of greatest controversy within the oil industry described in the first three chapters immediately following the introduction. In particular, Chapter 2, 'Accounting for Pre-Discovery Costs', gives a full analysis of the ongoing debate between the proponents of the two major methods. 'successful efforts' and 'full cost'. The development over the years of the arguments in favour of both is described, with the FASB's pronouncement in FAS 19 (December 1977) in favour of 'successful efforts' reproduced in full in an appendix to the text. As is inevitable, however, with a book such as this, events overtake the latest position covered in the narrative. In the United States, the SEC has failed to endorse the FASB's recommendations, opting instead for a previously untried variant of current value accounting, which it proposes to call 'reserve recognition accounting', whereby the value of a company's reserves will appear in its balance sheet as an asset, rather than the capitalised cost of finding such reserves. It is unfortunate, therefore, that a considerable number of pages within the book are devoted to FAS 19, whose implementation date has been suspended by the FASB, and which, given the present attitude of the SEC, may well fail to regain support.

The book itself is not wounded seriously by these subsequent developments, fortunately. It is a 'United Kingdom guide', and as such is comprehensive in its coverage of current activities and practices within the UK oil and gas industry. After considering 'Accounting for Development Costs and Production Activities', the major expense area for North Sea operators, in Chapter 3 and 'Depreciation, Depletion and Amortisation' in Chapter 4, it turns to a number of areas with which most of its readers are likely to be less familiar. Chapter 5, for example, covers 'Joint Operation Accounting', a most important area of practical significance, since most North Sea production licences have been issued to groups of unrelated companies, each of which holds an agreed proportionate interest in the licence and operating assets and liabilities. The detailed provisions typically found in joint operating agreements are given together with an explanation of the procedure whereby each separately identifiable constituent part of the total joint operation activity is individually authorised and controlled by AFEs (Authorisations for Expenditure).

This discussion leads neatly into Chapter 6, 'Some Aspects of Management Accounting', an oft-neglected area in oil accounting writings. Within this chapter the section on systems design considerations is likely to be most valuable to the principal potential readership of the work, namely the operating accountants. Chapter 7 outlines the accounting implications of financing arrangements, while taxation aspects are covered in Chapter 8. Both of these are informative, and should prove valuable as practical guides.

Moving on from there, the focus switches to 'Presentation and Disclosure in Published Accounts' in Chapter 9. This may well prove to be the most significant of the areas covered by the book, since it is a fruitful source of information not only for those readers familiar with the intricacies of oil industry reporting, but also for, perhaps, the lay reader of oil company accounts. In particular, the section on balance sheet presentation is most interesting, giving special consideration to fixed assets and stocks. Substantial insight into what lies behind the bald numbers is provided here. There is also an obvious link between the topics discussed in this chapter and those met in the following chapter on 'Government Reports'. Many of these reports have implications for the type of accounting system required by a licensee, and in particular for the way in which certain expenditures should be classified and accounted for. Here too, therefore, worthwhile returns may be had from diligent reading.

The final two chapters of the main text are devoted to a consideration of topics of interest in accounting generally, not necessarily specific to the oil industry; namely 'Inflation and Value Accounting', and 'Auditing Procedures and Practices'. However, both of these areas encompass particular problems when related to oil accounting. In the case of the former, the authors tell us that a 'substantial contribution to a complex subject' was made by Professors Welsch and Deakin of the University of Texas at Austin in their study sponsored by the American Petroleum Institute, *Measuring and Reporting the Replacement Cost of Oil and Gas Reserves.* That study recommended that the most appropriate valuation method to attempt to account for inflationary effects on oil companies' reserve holdings was the 'equivalent purchase cost' approach; a concept something akin to 'the net present value of future cash flows from oil and gas reserves currently held.' This approach, together with others, is described in the book, with the problem areas clearly defined leading to a conclusion which, while recognising that the practical problems of implementation are immense, hopes for a resolution of them by the ASC within the UK. As far as auditing is concerned, Chapter 12 gives a clear exposition of the critical areas and equally clear guidelines as to how to tackle them: yet another practically useful chapter for those who require such information. Finally appendices on 'Model Clauses for Offshore Production Licences', 'Summary of Tax Legislation relating to Oil and Gas Producing Companies', and the text of FAS 19 complement well the narrative of the two authors, and make the book a more complete package.

In summary, then, a worthwhile book. It is by no means an academic work, but, in fairness, did not set out to be such. For the audience to whom it is aimed it should prove an invaluable practical tool, and a basis from which the ASC may work when it comes to consider the problems of oil and gas accounting in the UK. The authors, together with the Accounting Principles and Auditing Panel of the Editorial Board of the Institute of Chartered Accountants of (sic) England and Wales are to be congratulated on providing this worthwhile contribution to discussion within the area.

University of Dundee Robert A. Lyon

European Financial Reporting: 4. The Netherlands. *J. H. Beeney and J. G. Chastney.* The Institute of Chartered Accountants in England and Wales, 1978. 185 pp. £7.00.

This is the fourth report in a series aiming at explaining accounting practice in a number of European countries. The larger part of the 185 pages is devoted to a description of the form and contents of 'the' annual report of Dutch companies (including some abstracts of the annual report of a Dutch company), based on literature as well as on a review of the annual accounts of a substantial number (54) of the firms having shares listed on the Amsterdam Stock Exchange. This description is preceded by three chapters covering respectively:

(1) the legal requirements;
(2) a description of some external factors influencing accounting;
(3) a note on the Dutch approach to replacement cost accounting.

At the end of the book the reader will find a summary of the main differences in financial reporting between the UK and the Netherlands. Finally, a bibliography and a glossary of Dutch-English words are included. In the remainder of this review the chapters are discussed in the order of presentation of the authors. Finally, some conclusions are offered.

Chapter 1 dealing with company law describes both the forms of business organisation and the reporting regulations contained in the Dutch Civil Code. This description is quite detailed, and as far as we can see, it contains very few errors. We noted only one major point which needs some comment. The report over-estimates the status of the Tripartite Study Group, which issues *Considerations*, by suggesting (p. 21) that 'where Accounts directly contravene precepts contained in the Considerations, they will entail qualification or disapproval....', and 'surprisingly, however, the Enterprise Chamber has made some decisions which do not entirely follow the Considerations'. In fact the Tripartite Study Group is a private group; its considerations are influential judgements of experts who represent sectors of the business community (i.e., employees, employers and accountants). Auditors, however, need not and generally do not express any qualifications if the Considerations are not followed. It is *their* responsibility to judge whether the accounts are in accordance with the Civil Code and present a true and fair view. The same holds for the court.

In chapter 2 some detailed information is provided concerning the taxation system, the capital markets and the accounting profession. Although this type of factual information may contribute to the understanding of Dutch financial reports, it is primarily useful for readers interested in investing in Dutch companies.

Chapter 3 offers a description of replacement value accounting with special reference to the Philips system as described by Goudeket (in 1960). Most of the other publications, as well as annual accounts to which reference is made, were also published eight or more years ago, and do not reflect the current state of the application of replacement cost accounting.

Chapter 4, which could be considered to be the most important part of the book, is devoted to the form and content of the annual report and accounts. By taking the RSV Engineers and Shipbuilders 1976 Annual Report as a typical example, a good description of accounting and reporting practice in the Netherlands is given. This chapter and Appendix Three, which presents a summary of main differences in financial reporting practices between the UK and the Netherlands, are probably very helpful in giving the British reader a clear overview.

The reviewer, however, feels that the description of deferred taxation (pp. 91–94) is not quite satisfactory, especially in the case of application of replacement cost accounting. In this case the tax amount deducted from profit is generally calculated as if replacement cost accounting were recognized by the fiscal authorities. Since it is not, an additional amount of tax is payable, which is deducted from the revaluation account. Technically speaking, this deduction is effected at the moment of revaluation by booking about 52% of the increase in value to the revaluation account and 48% to the deferred tax account. At the moment of the tax being payable, the amount is charged to the deferred tax account. Also in the area of deferred taxation the example of Wessanen is mentioned a few times. This firm deducts the deferred tax from the book value of fixed assets and inventories, thus showing these assets net of tax. This practice however is very uncommon in the Netherlands, and is therefore perhaps only a good example of the diversity allowed by the Civil Code, but not a good example of the practice of reporting on deferred taxes. This reservation, however, does not seriously inhibit the quality of the description in general.

As a general conclusion one might say that this report offers a good overview of the reporting practices of major Dutch firms. The approach taken by the authors makes this report useful to business as well as to accountants and accounting students. It is unfortunate for the authors that, since time passes so quickly, their report will be up-to-date for only a short period of time. The 4th Directive of the EEC will be implemented in the Civil Code shortly, and consequently many of the peculiarities of the Dutch accounting and reporting practices will no longer exist.

Vrije Universiteit, Amsterdam J. Klaassen

The Public Accounting Profession. *Stanley Charles Abraham.* Lexington Books, 1978. xx + 294 pp. £12.50.

Here is a book that cries out to be read by everyone with the good of the accountancy profession at heart. From this reviewer that is an unexpected conclusion because he admits to a bias against American texts; usually they prove very hard going and 'academic' ones virtually incomprehensible. As this book arises out of a doctoral dissertation submitted to the Graduate School of Management, University of California, Los Angeles, it is clearly American and clearly 'academic', so it is the type of thing that could be expected to be pretty indigestible. Far from it! It almost provokes the 'couldn't put it down till I finished it' type of reaction, and the reason is that the subject is interesting, it is treated in an interesting way and the writing avoids unnecessary jargon. Full marks to Mr Abraham on all these scores.

As explained in the introduction, the book endeavours to identify the fundamental problems faced by the accountancy profession in the United States, to find out how they have come about and to see whether there are any answers. The study starts from the basic premise that the profession was so busy reacting to successive crises that it was not devoting the time necessary to re-assess its priorities or direction. It was intended that the book would contribute to such a re-assessment. Although the problems identified are American and are considered in an American context, many of them are equally applicable to the UK and indeed to other parts of the world. Consideration of them can do nothing but good in pinpointing the difficult areas towards which all accountants (except the very old) need to bend their minds.

The research undertaken used the 'survey' technique. Two inquiries were undertaken in 1975 and the persons approached were intentionally not a random sample. They were chosen to represent the entire spectrum of the accountancy profession but all possessed one or other of the following special attributes:

(a) They were known to be 'opinion shapers'.
(b) They had written or spoken on the profession's problems.
(c) They were known for holding strong views on those problems.
(d) They were recognised leaders, spokesmen or authorities.
(e) They had been members of a leading professional committee or had given testimony to such a committee.

One hundred and thirty eight individuals took part in the first inquiry. The second inquiry arose out of the first and was designed to supplement its findings. One hundred and thirty four respondents were involved in the second inquiry, of whom about 70% were the same as participated in the first. The information obtained from all these respondents forms Part I of the book.

Separate chapters in Part I deal with the problems identified from the surveys as facing the profession. The main heads are problems of the profession's role in society, financial reporting problems, rulemaking, independence, technical standards and performance, litigation and liability, government intrusion in standard setting, detection of fraud, concentration of firms, personnel problems, specialisation, and social and non-financial accounting, with a number of sub-heads considered under each one. (Education features under both technical standards and personnel problems.) The problems considered in those chapters were put to the respondents of the second survey who endeavoured to assess their relative importance, their potential for solution and the remedies, opportunities and consequences for the future. A separate chapter summarises what emerged from this inquiry.

Part II of the book, aptly entitled 'The Turbulent Present', considers the factors which affected the profession, and in particular the problems already identified, during the two years following 1975. It appraises the extent to which the profession had succeeded in bridging its 'credibility gap' and it gives attention to the attitude of the SEC, to the Moss and Metcalf Reports and to the views of the Commission on Auditors' Responsibilities (the Cohen Commission). Additionally it provides an interesting and helpful commentary on some of the legal cases affecting the profession in the United States. Finally, the action to be taken if the profession is to preserve its autonomy and restore public confidence in auditors is put forward for consideration. Particular steps suggested are:

(a) Clarification of the profession's central role in society.
(b) Continuance of the work of FASB, subject to SEC oversight.
(c) Increase of auditor independence.
(d) Concentration of power among accounting firms to be reduced.
(e) Appointment of non-CPAs to the profession's executive committees.
(f) Regulatory mechanisms to be improved and tightened.
(g) Establishment of an independent institute to perform long-range planning and research.

All of these, it will be noted, have relevance on the British scene, *mutatis mutandis* and with differing degrees of emphasis.

One of the fascinating things about this book is that there are so many views expressed, some of which contradict each other. (*Quot homines, tot sententiae*!) Nonetheless, a pattern emerges and the author has been able to draw together conclusions which fulfil his intention of contributing to a re-assessment of the profession's priorities and where it is going. There are several quotations from the responses received—some of them are quite pithy—while others are summarised in a lively and entertaining fashion. Not least in interest, though of rather less current practical value, is the appendix of responses given to a 'fantasy' question, which asked the respondents to indicate how they foresaw the profession in America in 25 years time. In particular they were asked to identify what at that time would be likely to please them. Needless to say, a number were not at all pleased with what they saw, and some saw no accountancy profession at all.

For those interested in the research methods adopted there is an appendix which describes them. The survey instruments themselves are also reproduced in two further appendices. The analytical techniques used included the echo method, cross-impact matrix analysis and cross-impact simulation using KSIM. Brief explanations of these are provided. There is a useful index, and each chapter has a comprehensive bibliography.

Whether this book will be popular in the United States is a question this reviewer is not equipped to answer. There are some fairly swingeing criticisms of a number of sacred cows (e.g. 'the profession's vague standards of work and nonexistent criteria of competence'). That it should be popular over here he is in no doubt—popular not because of criticism of accountants in another part of the world but because, standing back at the distance of the Atlantic Ocean, one can clearly discern the difficulties without personal involvement blurring the vision. This should help us all to measure our own performance and to identify where we fall short. If we can do that in a calm, dispassionate way, perhaps we can help the leaders of the profession in the United Kingdom to find the solution to our problems.

Edinburgh P. N. McMonnies

Contributors to Accounting and Business Research Volume 9 No 35 Summer 1979

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READINGS IN ACCOUNTING AND BUSINESS RESEARCH 1970–1977

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A.B.R. 9/36—A

An Empirical Analysis of the Impact of Uncertainty Qualifications on the Market Risk Components

C. Wayne Alderman

Attestation as to the degree to which a firm's financial statements present fairly the results of operations and financial condition of the firm in accordance with generally accepted accounting principles is among the most basic services provided by the public accounting profession. The profession has historically recognised the communication process as one important aspect of this attest function.

Both in the United Kingdom and the United States, auditors express an unqualified opinion when the financial statements or accounts have been examined to their satisfication. In certain situations, however, unqualified opinions cannot be expressed by the auditor. For example, when material uncertainties exist whose effect on the financial statements cannot be reasonably determined at the date of the audit report, the auditor expresses a qualified opinion.

In the United States, the term 'subject to' (the resolution of the uncertainty) is used for such audit opinion qualifications. The phraseology in the United Kingdom for this type of opinion qualification is 'subject to the foregoing reservation...'

Report of the Commission on Auditors' Responsibilities

In 1974, the board of directors of the American Institute of Certified Public Accountants established an independent study group to develop advisory conclusions and recommendations regarding the role of independent auditors in the United States. Officially entitled the Commission on Auditors' Responsibilities (CAR), this study group included reporting on uncertainties in both its formal delineation of issues to be considered (1975) and its report of conclusions (1978).

The Commission devotes one major section of its final report to an analysis and subsequent recommendations regarding auditors' reporting obligations for significant uncertainties. After presenting current reporting requirements for uncertainties, the Commission discusses relevant issues and presents its recommendations for improving this aspect of the auditors' reporting obligation. The CAR identified financial statement users' misunderstanding and contradictory audit requirements as two areas of concern that influenced their recommendations regarding the appropriate requirements for reporting on uncertainties.

The Commission concluded that users have little understanding of the appropriate meaning and significance of the 'subject to' qualification. In that regard, the Commission states (1978, p. 25):

> The 'subject to' phrase is ambiguous to users because there is no way for them to tell whether the auditor's intention is only to highlight information more fully disclosed elsewhere or to indicate a deficiency in the financial statements.

Recognising that the accounting concepts of fair presentation and full disclosure necessitate disclosure of any significant uncertainties in the footnotes to the financial statements, the Commission thus questions the desirability of any need for concurrent disclosure in the auditor's report. The Commission observes (1975, p. 25):

> If a reasonable estimate cannot be made of the outcome of the uncertainty and the circumstances surrounding the uncertainty are adequately disclosed, the financial statements are not deficient.

Other accountants likewise have echoed this sentiment. Magill, for example, stated (1976, pp. 80–81):

> The issue is whether that reporting responsibility [on uncertainty qualifications] should be continued or lifted... contingencies having been properly accounted for or disclosed (in accordance with FASB Statement No. 5), are not the financial statements 'fairly presented?' Why does the auditor have to report further?

Noting that the role of the auditor is to evaluate whether financial information conforms with the standards of the profession, the Commission states that present reporting requirements for uncertainties are neither consistent with nor appropriate to the auditor's proper role. They observe that when reporting on uncertainties, the auditor must not only report financial information but also interpret that information.

Because of these and other factors, the Commission has recommended that the audit requirement for expression of a 'subject to' qualification when material uncertainties exist be eliminated. The Commission further observes (1978, p. 29):

> In combination with improvements in financial accounting standards for the disclosure of uncertainties, eliminating the requirements should improve understanding of both the effect of uncertainties on financial statements and the auditors' responsibility when uncertainties exist.

This study measures one aspect of the role of uncertainty qualifications so that useful insights and evidence regarding the issues raised and conclusions reached by the Commission might be provided. To achieve these objectives, the impact of uncertainty qualifications on risk was selected as an appropriate measurement tool.

As noted in financial and microeconomic theory, risk and returns are relevant items of information in evaluating the value of any asset, The importance of risk has likewise been noted in the accounting literature. The Financial Accounting Standards Board, for example, has stated (1976, p. 24):

> The essence of investment and lending decisions is to balance expected rate of return and expected risk. Thus, investors and creditors need information about both prospective returns and prospective risk of investment and lending opportunities.

In summary, both accounting and financial literature support the concept that for an item to have information value it must convey information about risks and/or returns.

With the development of portfolio theory in financial literature, the concept of risk has been re-examined. Two market components of risk have been identified: unsystematic risk and systematic risk. Representing the covariability of the security's return to general market conditions, systematic risk cannot be eliminated through diversification. Thus, variability in a security's returns related to market movements comprises the systematic risk component. Unsystematic risk, however, represents the portion of risk not related to general market conditions. This risk component results primarily from variability in returns unique to the security. Consequently, unsystematic risk can be eliminated by the investor through diversification of his portfolio. In the context of an efficient capital market, these risk components provide unbiased estimates of the risk of a security and, as such, are the relevant risk measures in this study.

Purpose of this study

The purpose of this study is to determine one aspect of the value of selected uncertainty qualifications as evidenced by their impact on risk. The risk measures utilised in the study are risk components assigned by the capital market. This research effort, therefore, examines attestation, an accounting function, in terms of its impact on a financial concept of risk, the capital market risk components.

An analysis of the impact of uncertainty qualifications on market-assessed risk should provide insights regarding both the audit opinion qualification and the related conclusions of the Commission on Auditors' Responsibilities. If uncertainty qualifications have an impact on market-assessed risk, then the evidence supports the contention that the qualification has informational value regarding risk to investors and thus serves a useful purpose. Alternatively, if the results indicate that uncertainty qualifications have little impact on risk, then the evidence of this study supports the intuitive reasoning of the Commission and their related recommendation to eliminate the 'subject to' qualification.

Methodology

To measure the impact of uncertainty qualifications on the market risk components, an appropriate methodological design must be specified. Presentation of the methodology selected is divided into three parts: (1) the measurement model, (2) time-frame of the analysis and (3) sample selection.

The Measurement Model

The measurement model selected for the study was the market model, as proposed by Markowitz (1959) and later extended by Sharpe (1963). The model specifies a linear relationship between the return on security i in period t and the return on the market, m, in period t. The model holds that:

$$R_{it} = a_i + b_i R_{mt} + u_{it} \tag{1}$$

where R_{it} is the natural logarithm of the return relative on security i in period t and R_{mt} is the natural logarithm of the market return in period t. The market return was represented by the Standard and Poors Industrial Index of 425 stocks and was computed by dividing the index at the end of the period by the index at the beginning of the period. Dividends were thus omitted from market return (R_{mt}) calculations resulting in a possible methodological limitation in the study. Ordinary least squares regression procedure is performed to obtain estimates of a_i and b_i.

Although other models have been formulated to measure security characteristics, the market model was not considered inappropriate for this study's objectives. These other models also employ the concept of the beta coefficient in their measurement of security returns. In the alternative models, beta coefficients are computed from the market-model regression procedure and then utilised in the operational model. As the beta coefficient is of primary importance in this study, the market model offers an appropriate and widely used technique for this computation.

Time Frame of the Analysis

To analyse the systematic and unsystematic risk components, the least squares regression from the market model must be computed for selected periods using time-series data. Month M_0 was defined as the date of the issuance of the audit report under examination and represents one period in which the systematic and unsystematic components will be computed. To measure changes in the risk levels over time, the risk components must also be computed for periods prior and subsequent to the audit report.

Since the market model employs a time-series analysis of returns, care must be exercised in selecting periods prior and subsequent to the audit report so that observations that overlap with observations used in the computations for month M_0 are minimised. Common observations in the periods under examination could result in measurement error regarding the impact of firm-specific events and, thus, bias the results. However, minimisation of common observations must be tempered by the need to have an appropriate number of observations for the analysis and yet have the periods close enough so that other firm characteristics are stable. Based upon these factors, 36 months was selected as an appropriate time period for examination prior and subsequent to month M_0. These months, symbolically represented by M_{-36} and M_{36}, are the periods that will be used to measure changes in systematic and unsystematic risk levels.

Thirty-seven observation were selected for the computations for each regression line since this provides an appropriate number of observations and minimises common observations. Figure 1 indicates each of the 73 periods under examination and the 37 observations in each regression analysis. Systematic risk and unsystematic risk are computed by employing the market model and 37 monthly time series observations centred around the appropriate examination month.

Sample Selection

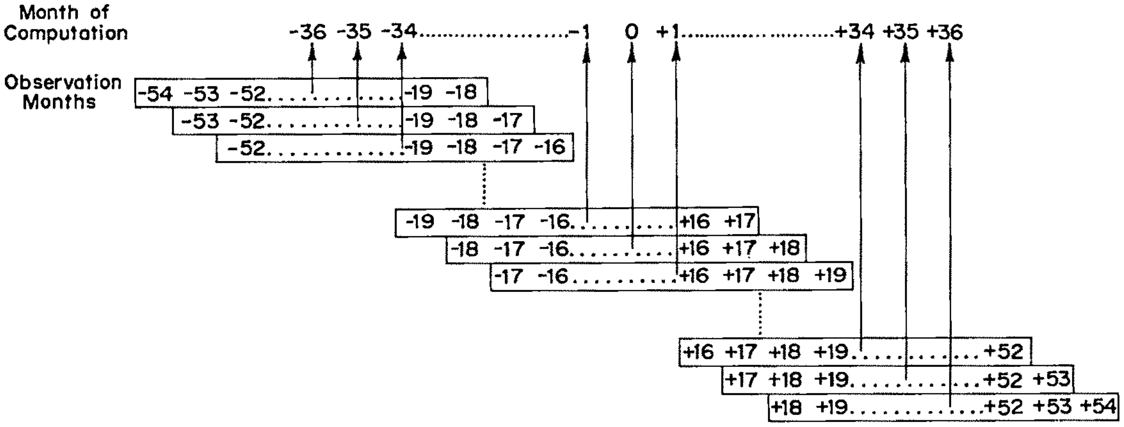
To examine the impact of uncertainty qualifications an appropriate sample of firms receiving such audit opinions was selected. In addition, a control sample of firms that had received only unqualified opinions was also formed.

Each year the American Institute of Certified Public Accountants (AICPA) publishes *Accounting Trends & Techniques* (*ATT*), a survey of the accounting and reporting practices of 600 industrial and retail firms as presented in the firms' annual reports to the stockholders. Firms selected for the survey are those that the AICPA believes are representative of American companies. The surveyed firms generally continue to appear in *ATT* as long as the firms remain viable going concerns and distinct business entities. Accordingly, the firms listed in *ATT* provide an appropriate basis for the initial screening process of the study.

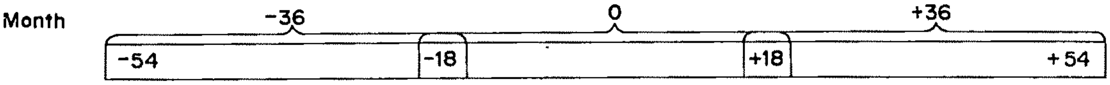
Firms in *ATT* during the years 1968–1971 were identified for initial inclusion in the samples. This time frame was selected for the analysis since it

Figure 1
Schematic Representation of the Months for which Computations are made and the Appropriate Observations used in these Computations

Months in which the Risk Components are Computed:



The Relevant Months for the Measurement of Changes in the Risk Components:



represented a relatively recent period with a large number of audit opinion qualifications.

To ensure that stock price and dividend data were readily available each firm was required to be included in either the CRSP monthly tape or the COMPUSTAT quarterly tape.[1] This requirement eliminated two firms from the experimental sample.

To isolate the impact of the opinion qualification, the requirement was formulated that for each year under analysis prior to the qualification year, sample firms would receive only unqualified opinions. In addition, firms that receive audit opinions qualified for more than one reason were eliminated from consideration to eliminate extraneous factors that might have an impact on the results. No restriction was placed on audit opinions received subsequent to the initial uncertainty qualification. Such a restriction would have severely limited the size of the experimental sample since firms that initially receive uncertainty qualifications generally continue to receive them for several years.

A control sample of firms receiving only unqualified opinions was also selected. A cursory review of these firms' financial statements and audit reports indicated that significant uncertainties did not exist for firms in this control group. These firms were randomly selected from the 121 firms in *ATT* that received unqualified opinions only during 1964–1974. Since these firms received only unqualified opinions, an appropriate year for the examination of the audit report did not exist. Consequently, the appropriate audit report year (1968–1971) was randomly assigned to each firm in the control sample so that the years under examination per *ATT* matched between the experimental and control samples.

Although the fiscal year end of all companies surveyed is noted in *ATT*, the date of issuance for each firm's audit report is not given. Generally, audit reports are issued from four to eight weeks subsequent to the company's fiscal year end. However, in some circumstances the date of issuance of the audit report can significantly differ from this pattern. To ascertain the date of the audit report under examination, M_0, the appropriate annual report and audit opinion of each firm was examined.

To ascertain if any industry concentrations existed, the three digit Standard Industry Classification (SIC) code was examined for each firm in the control and experimental samples. Each sample included seventeen industries with no

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[1] The CRSP (Center for Research in Security Prices) Tapes of the Graduate School of Business of the University of Chicago include monthly stock and return data for New York Stock Exchange firms for the period 1926–1977. The COMPUSTAT quarterly tapes contain detailed financial information as well as monthly security prices and quarterly dividends. The COMPUSTAT tapes are maintained by Investors Management Services, Denver, Colorado.

Table 1

Summary Presentation of Time-Series Data: Significant Changes in Risk

	Risk Components							
	Systematic				**Unsystematic**			
	Prior Three Year Period		*Subsequent Three Year Period*		*Prior Three Year Period*		*Subsequent Three Year Period*	
	Significant Change*	*No Significant Change*	*Significant* Change*	*No Significant Change*	*Significant* Change*	*No Significant Change*	*Significant* Change*	*No Significant Change*
Experimental Sample (Uncertainty Qualifications)	0	20	2	18	1	19	1	19
Control Sample (Unqualified Opinions)	1	19	3	17	1	19	1	19
χ^2 Value	0·003		0·229		0·000		0·000	

* Significant changes were determined at an alpha level of 0·05 using the test of parallel lines (see Brownlee (1965), pp. 354–357). Tests of significance at alpha levels of 0·10 and 0·15 indicated similar results.

Table 2

Summary Presentation of Time-Series Data: Direction of Changes in Risk

	Risk Components							
	Systematic				**Unsystematic**			
	Prior Three Year Period		*Subsequent Three Year Period*		*Prior Three Year Period*		*Subsequent Three Year Period*	
	Increase	*Decrease*	*Increase*	*Decrease*	*Increase*	*Decrease*	*Increase*	*Decrease*
Experimental Sample (Uncertainty Qualifications)	10	10	11	9	11	9	10	10
Control Sample (Unqualified Opinions)	10	10	12	8	9	11	11	9
χ^2 Value	0·000		0·102		0·400		0·100	

Table 3
Mann–Whitney U Test

	Significant (one-tail test) at an alpha level of				*Not Significant at 0·20 or less*	*Totals*
	0·05	0·10	0·15	0·20		
Systematic Risk	0	1	7	6	59	73
Unsystematic Risk	45	23	4	1	0	73

more than two firms in any given industry. Thus, no significant industry concentrations existed.

While the samples were matched on the basis of years and no industry concentrations existed, the samples were not matched or examined for other factors such as risk class, leverage, or size of company. This, unfortunately, represents a methodological limitation of the present analysis.

After the preceding criteria were applied, twenty firms represented the final composition of each sample. These small sample sizes result partially from the limited number of uncertainty qualifications issued annually and also from the requirements imposed by the methodological design. As a consequence, conclusions reached from the present analysis should be tempered by an awareness of the small number of firms in the samples.

Analysis

Measurement of the impact of uncertainty qualifications on the market risk components indicated that a time-series analysis was appropriate. In addition, an examination of the data revealed that cross-sectional analysis could also prove beneficial.

Time-Series Analysis

Behaviour of unsystematic and systematic risk was not expected to differ over time between firms receiving uncertainty qualifications and firms receiving unqualified audit opinions. The factors that typically generate uncertainty qualifications are firm-specific rather than market-related. Firm-specific factors can be diversified away by the investor and thus do not impact upon systematic risk. Further, these firm-specific factors are generally known by investors for some time prior to the audit qualification. As a consequence, no additional variation in the residual was expected and thus no impact on unsystematic risk. For the examination of these expectations, two tests were developed to determine whether significant differences exist between the experimental and control samples in regard to the frequency of firms experiencing (1) significant risk changes over time and (2) direction of risk level changes, regardless of magnitude, over time.

Frequency of significant changes in the risk components for the experimental and control samples is presented in Table 1. An examination of the data indicated that very few firms experienced significant changes in risk over the time period studied. Measurement of significant changes, however, did not indicate whether significant differences existed between the samples regarding frequency of simple increases and decreases. Although the firms in any sample may experience changes in beta in a consistent direction, if the changes are not of a magnitude to indicate a significant change, then the phenomenon of changes in beta in a consistent direction would not be detected. Accordingly, measurement of the frequency of direction of risk level changes, regardless of magnitude (i.e., statistical significance) was also performed. The frequency of direction in changes in the risk components for the two samples is presented in Table 2.

To determine if the samples in each matrix differed with respect to the defined risk changes a chi-square (χ^2) analysis was performed.[2] For significant differences to exist between the samples at an alpha level of 0.05, the chi-square value for the

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[2] The chi-square values were computed for each of the eight matrices without an adjustment for continuity. When sample sizes are small, chi-square values are often adjusted for continuity (see Siegel, pp. 107–110). The adjustment generally reduces the chi-square statistic and thus offers a more conservative approach when the researcher expects significant differences to exist. However, in this research study, significant differences are not expected to exist. The chi-square value consequently offers the more conservative approach given prior intuition. Further, computations of chi-square values adjusted for continuity indicated similar results.

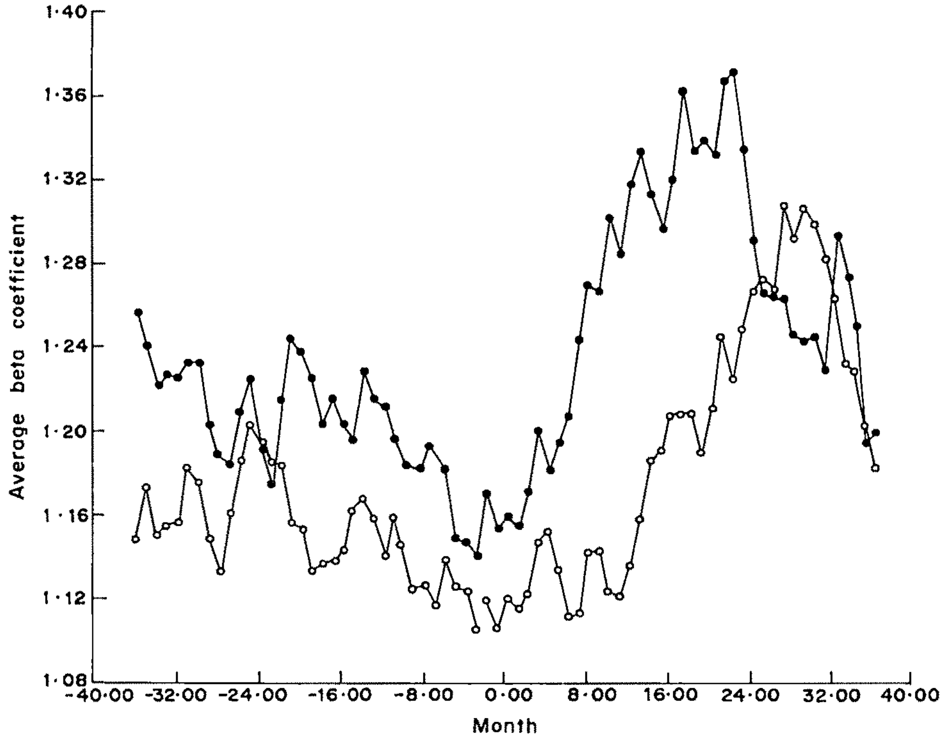

Figure 2
Plot of Average Beta Coefficient.
○ = Unqualified opinions ● = Uncertainty qualifications

appropriate matrix must be greater than 3·831.[3] Thus, based on the data of this study and the statistical procedures employed, neither the frequency of risk level changes nor the frequency of significant risk changes in either risk component is more prevalent for firms that received uncertainty qualifications than for firms that received unqualified opinions.

Cross-Sectional Analysis

The preceding analysis disclosed that uncertainty qualifications did not have a significant impact on the capital market risk components. An important related aspect not examined involved differences between samples in the levels of the risk components over time. Regrouping of the data provided a basis for disclosing any significant cross-sectional differences between the samples.

To test these expectations, systematic and unsystematic risk as computed for each firm for each of the 73 time periods was utilised. In addition, arithmetic averages for the risk components in each sample were computed for each period t as follows:

$$\bar{b}_t = \frac{\sum_{i=1}^{n} b_{it}}{n} \quad \text{for} \quad t = 1, 2, \ldots, 73 \tag{2}$$

$$\bar{u}_t = \frac{\sum_{i=1}^{n} u_{it}}{n} \quad \text{for} \quad t = 1, 2, \ldots, 73 \tag{3}$$

Plots of the arithmetic averages are shown in Figure 2 for systematic risk and Figure 3 for unsystematic risk. Comparisons of data between adjoining months, of course, are not independent since this data is based on many identical observations. This lack of independence, however, is reduced as the dates are expanded over the 73 month period.

To determine whether firms that received uncertainty qualifications exhibited greater levels of unsystematic risk, the Mann-Whitney u test, a non-parametric test, was applied to the data. Results of the tests are shown in Table 3.

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[3] For an alpha level of 0.10, the appropriate value for rejection of the null hypothesis is 2.706. For any 2 × 2 matrix, there exists one degree of freedom.

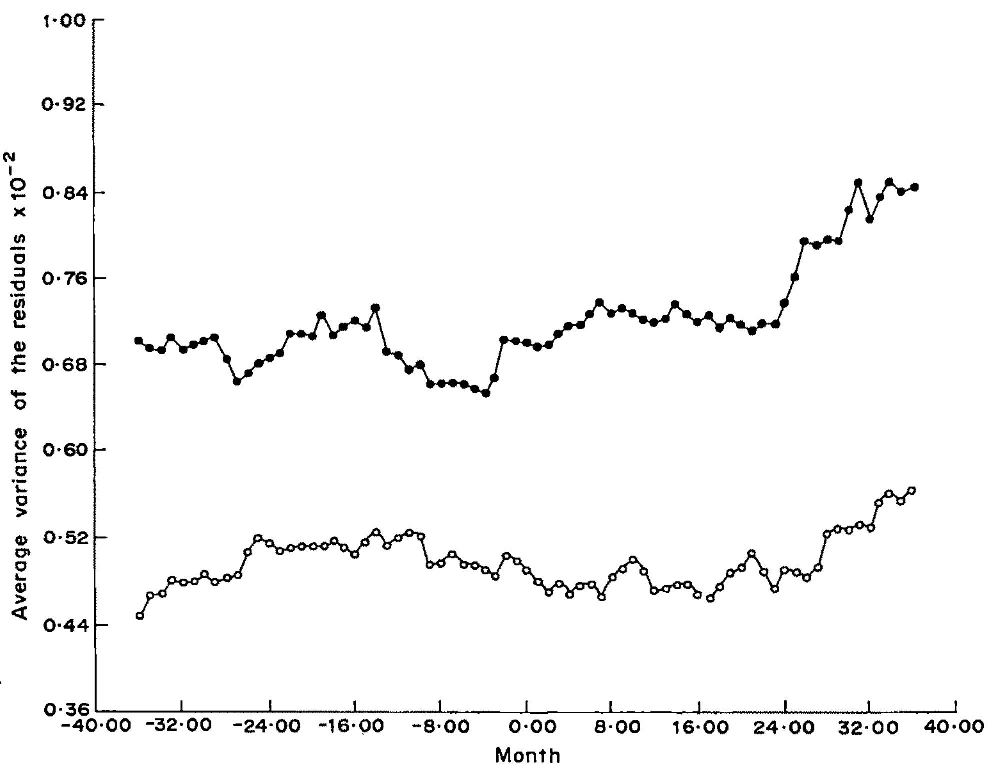

Figure 3
Plot of Average Unsystematic Risk.
○ = Unqualified opinions ● = Uncertainty qualifications

Cross-sectional analysis indicated that levels of systematic risk did not differ greatly between firms receiving uncertainty qualifications and firms receiving unqualified opinions. The cross-sectional analysis of unsystematic risk, however, indicated that firms receiving uncertainty qualifications consistently exhibited larger levels of this risk component.

Conclusions

The finding that uncertainty qualifications had little impact on the risk components indicated that the market had previously recognised any impact of the uncertainty on risk and, accordingly, had reflected such an assessment in the price of the security. In the environment of an efficient market, the price of the security fully reflects the appropriate underlying risk characteristics of the security. Unless the uncertainty qualification communicates new information on the risk assessment, no change in risk levels should be expected. Data in this study indicated no change in risk levels. Thus, one may infer that uncertainty qualifications communicated little new information regarding risk.

Cross-sectional analysis revealed that, while no differences in levels of systematic risk were noted, levels of unsystematic risk were consistently larger for firms receiving uncertainty qualifications. Thus, the security returns of these firms have a greater degree of variability that cannot be explained by the market factor. Upon examination of events that typically necessitate uncertainty qualifications, this behaviour is not surprising. Characteristics of the uncertainty indicate that relatively large adjustments to the security's price by investors would occur due to changes in perception regarding future security returns. Such adjustments would be reflected in the residual of the company and, thus, necessitate continued greater levels of unsystematic risk. Although uncertainty qualifications have little *impact* on the risk components, per se, the securities of firms receiving such qualifications do exhibit *continued* larger levels of unsystematic risk.

Evidence from this study also provides empirical support for the contention of the Commission on Auditors' Responsibilities that the need for and usefulness of 'subject to' qualifications should be reassessed. Results of the study indicate that uncertainty qualifications have little impact on the market's assignment of risk, a basic asset valuation component. Consequently, a reassessment of the function of uncertainty qualifications would seem appropriate.

The Commission on Auditors' Responsibilities suggests that 'subject to' qualifications are confusing to users. In the conclusions of the Commission, an intuitive explanation is offered regarding the reason users would ignore these uncertainty qualifications. The Commission states that '... the auditor frequently is in no better position than the user of financial statements to predict the ultimate resolution of many uncertainties' (1978, p. 27). Logically, if users recognise that their evaluation of the impact of uncertainties on the financial statements is as valid as the evaluation of independent auditors, then the uncertainty qualification should be ignored. Given the attainment of full disclosure and fair presentation by disclosure of the uncertainty in the footnotes to the financial statements, then it is possible to ask what useful purpose does the uncertainty qualification serve?

Of course, this is the issue the Commission has raised. They recommend that the profession eliminate the requirement for the expression of the 'subject to' qualification. Evidence from this study supports the reasoning and conclusions of the Commission.

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Accounting for Interest During Construction

Harold Bierman, Jr. and Thomas R. Dyckman

In December 1976, the FASB issued a discussion memorandum on the 'Conceptual Framework for Financial Accounting and Reporting', and in December 1977 it issued a discussion memorandum on the subject of accounting for interest costs. The objective of this paper is to develop a consistent framework for treating interest during construction within the boundaries of the conceptual framework study. Capitalisation of interest is the major accounting problem requiring solution that involves interest.

We will consider four basic questions:

(a) Should debt interest be capitalised?
(b) Should interest be capitalised on both debt and common stock capital?
(c) At what rate should interest be capitalised?
(d) What disposition should be made of the credit that arises from the capitalisation?

The practice of accounting for interest while not uncommon is neither uniform among firms of the same industry nor across industries. Of the 600 companies covered in the AICPA's annual survey of accounting practices for 1975, 41 firms indicated that they capitalised at least some of the interest costs associated with new construction [AICPA 1975, p. 267]. This percentage is larger for public utilities.

In the early 1970s with high interest rates and an increase in the amount of debt needed to finance new construction, there was an increase in the number of firms capitalising interest during construction. The shift to capitalising interest caused concern in Washington and in 1974 led the Securities and Exchange Commission to impose a moratorium on the adoption or any extension of policies resulting in capitalising interest by companies other than public utilities, real estate companies, and saving and loan associations pending the adoption of standards for reporting such costs by the FASB. The FASB is in the process of responding to the need for standards in this area.

The approach to accounting for interest during construction described here will be based on several assumptions concerning accounting objectives. Basically these relate to the proper determination of income via the matching principle and the valuation of assets as economic resources based on eventual net cash inflows. We will argue that both points of view, the asset-liability view and the revenue-expense (matching) view, lead to the recognition of interest expense during construction as a capitalisable cost. The initial development will be done in a world characterised by no taxes. This limitation will be relaxed in a later section.

Basic assumptions

Our conclusions follow logically from the acceptance of a few basic assumptions about how to account for economic events. First, from the perspective of matching revenues and expenses, an expenditure made today to benefit a future period is not an expense today but rather an asset. The expense is recognized only when the revenues are earned, or when it is ascertained that the anticipated revenues will not be earned, in which case a loss is recognised. This logic applies to all expenditures including an expenditure for the use of money (namely interest).

Secondly, adopting the asset-liability point of view, it is appropriate for the accountant to record well-defined opportunity costs even though cash is not explicitly received or disbursed. Such foregone opportunities imply the expectation of future net cash inflows. They also represently measurable sacrifices made to obtain the asset's services. Thus, if $1,000 invested in US Treasury notes could earn 7% then there is at least a 7% cost of money in any alternative use. This opportunity cost should be recorded as an addition to the asset's cost in a situation where construction is taking.place. If the asset is already in operation, the debit would be made to an asset account. This would affect the depreciation expense indirectly. We do not know whether or not there will be an effect on net income.

Third, while in general revenue and income should not be recognised until realised as a result of an external transaction, there are situations where more distortion is introduced by not recognising than by recognising such revenue. Thus, in a situation where funds are tied up in construction activities, recognition should be given to the revenue arising from the opportunity cost of using the funds in construction rather than in an alternative use (such as investing in default-free short-term federal government term securities).

While the above conclusions are theoretically defensible, their prime justification in the case of assets constructed over long time periods is that their use avoids distorting both income and financial position.

Should debt interest during construction be capitalised?

We believe that interest during construction is a necessary cost of construction and should be included in the capitalised cost of the asset. For supporting arguments the reader is referred to a classic discussion of the issues contained in Arthur Andersen and Company's 1953 publication. For more recent statements see Pomerantz and Suelflow [1975].

Consider the acquisition of a plant by a public utility where the purchaser can pay $100,000,000 at the beginning of a two year construction period or $121,000,000 at the end (a so-called turnkey contract). The higher price recognizes the time value of money involved in the delayed payment, assuming the firm has a cost of money of 10%. For simplicity we assume a zero tax rate and that the firm will borrow the funds needed using a single payment loan repaid at the end of the second year.

If payment is made at the beginning of the first year, the total cost will be $100,000,000 for the plant plus $21,000,000 of interest costs [0.1($100,000,000) + 0.1($100,000,000 + 0.1($100,000,000))]. If the payment is made at the end of the two-year period the total explicit cost (purchase price) of the plant is $121,000,000.

The total cost of the plant is $121,000,000 (as can be seen when payment is made at the end of the two years) in both cases. The capital cost of $21,000,000 for interest is as much a cost of the building as the labour, bricks and mortar that went into its construction.

Is the $10,000,000 interest of period one an expense of that period or of a future period? There are several reasons for capitalising the amount. An expensing results in an understated asset. The asset purchased on a completed basis would include the interest cost. Also, in a world of certainty the value of the asset would have to be equal to or greater than $110,000,000 at the end of one year.

Secondly, expensing results in a depressing effect on income in period one. Income is depressed merely because the firm invested in a real asset rather than in a monetary asset. This is an undesirable type of distortion. The firm did not lose $10,000,000 in period one because it paid that amount of interest any more than it lost $100,000,000 because it made expenditures for the land, labour, and materials that went into the process.

Interests costs arise from the passage of time and can be identified with specific periods of time. This does not mean, however, that they are 'expenses' of that time period. The interest cost can be associated with an increment in value of an asset.

Should interest be capitalised on stock equity?

If debt is used to finance construction, the capital cost is explicit. If equity funds are used, the interest cost is implicit: it is an opportunity cost. For example, the stockholder's funds could have been used to retire present debt, or they could have been invested in short-term federal government securities to earn a default-free return. While there are many other alternative uses, we will focus on these since the returns from such uses are certain. The returns from these alternative uses were given up in order to pay for the construction and, as such, represent a cost of the construction. This opportunity cost is readily measurable.

Thus the presence or absence of an interest capital cost on the funds employed during construction is not dependent on the nature of the financing. The only requirement is that there be a material time lag between the start of construction (and first payment) and the placing of the asset into service, or that the amounts of capital involved be large. The argument being made is that interest during construction should be capitalised if the amounts are material.

However, even if it could be agreed that interest on funds committed to construction is properly capitalised, the issue of what amount of interest to capitalise remains. The amount of interest to capitalise depends on the interest rate. We now turn the discussion to the problem of selecting from among several alternative rates.

The rate of interest

What rate of interest should be used to compute the interest during construction? We will consider three possible choices:

(1) The weighted average cost of capital (WACC)
(2) The cost of borrowing
(3) A near risk-free rate (perhaps that on government securities for a duration similar to that of the expected construction).

We will continue for now to assume zero taxes. This limitation will be relaxed at a subsequent point in the paper.

The use of the WACC can be supported on the basis that investors (including common stockholders) invested in the firm expecting to earn a capital-attracting rate of return. If the stockholders wanted a return of 14% and if, considering a lower cost of debt, this leads to a WACC of 10% then it is necessary to record interest on construction at a 10% rate if the stockholders' required return is to be the basis of the entry.

Now it is possible that if the investors understood the nature of interest during construction, they would accept a lower rate. Or the source of capital may not be the normal mix of debt and common stock. For example, if the specific project is financed entirely by debt it could be maintained that the actual interest cost should be capitalised and there is no need to consider the cost of equity. But it is not valid to assume, for a firm whose capital structure is and will remain 40% debt and 60% equity, that one asset is financed 100% with debt while other assets are financed with all stock.

The typical firm does not have a guaranteed return but rather faces a considerable amount of risk. The return measured by the WACC may or may not be earned in the future. While there are purposes (such as rate regulation) where the use of WACC may be appropriate, for the more general purposes of financial reporting a cost that does not contain an element of reward for undertaking risk should be used. The cost should reflect only the time value of money. The borrowing rate is appropriate since the firm engaged in self construction can earn that return by retiring a similar debt issue.

A firm can earn a certain return by retiring presently outstanding debt or by not issuing new debt. This implies that the firm's borrowing rate is appropriate even when common stock funds are being used. The measure does not attempt to reflect the return required by the stockholders but rather the opportunity cost (the funds could be used to retire debt) of the funds committed to the project.

Continuing the same line of thought, assume the firm has cash and no debt. It can invest the funds in construction or in monetary assets ranging from short-term federal government securities to commercial paper of relatively risky firms. In this case the use of the return on short-term default-free federal government securities could be used to avoid the extremely difficult problem of adjusting the normal return of risky securities for the expectation of default.

Thus the use of either the borrowing rate or the lending rate (default-free return) can be defended depending on the facts of the situation. If the firm has callable debt with a well-defined effective cost, then this rate sets a minimum cost for the capital of the firm.

Capitalisation assumption and tax implications

The fact that interest is tax deductible affects the cost of debt and hence the amount of interest to be capitalised. Moreover, since earnings on stock do not have a similar tax shield, and the firm will use a mixture of stock and debt, the tax consequences must be carefully reflected in the interest costs to be capitalised.

Assume that

L	is the proportion of funds raised through debt and $L = B/V$ where V is equal to $B + S$
B	is the amount of debt
S	is the amount of stock
k_i	is the cost of debt (and the opportunity cost of common stock funds)
t	is the effective tax rate
i	is the rate to be used to capitalise interest.

Then

$$iV = k_i B(1 - t) + k_i S$$
$$i = k_i(1 - t)L + k_i(1 - L)$$
$$i = k_i(1 - Lt)$$

Example

Assume $k_i = 0.10$, $L = 0.3$ and $t = 0.48$, $Lt = 0.144$ then:

$$i = k_i(1 - Lt) = 0.10(1 - 0.144) = 0.0856.$$

If $100,000,000 is committed to construction, then $8,560,000 of interest should be capitalised for the first year.

Capitalised interest (except implicit interest on stock equity capital) is deductible for tax purposes. If conventional normalisation procedures were used, the tax deductibility of the interest would not result in an income effect in the year of the payment of the interest, even though the interest is capitalised.

The credit

The basic entry for capitalising interest is:

Asset	XXX	
Interest		XXX

If debt is outstanding, then the above entry is merely an allocation of the interest expense already recognised to an asset account. The amount in the asset account should be depreciated in a manner consistent with that used for the rest of the asset.

The more interesting question surrounds the treatment of the credit when the asset is financed, at least partially, with common stock. In this case, the firm could invest in marketable securities or use the idle funds to reduce its present debt level.

By using the funds for construction the firm is giving up explicit income. Given two identical firms where one contracts construction while the other constructs its own asset, comparable income figures will result only if the constructing firm interprets the credit arising from the implicit interest on construction as income. This tends to produce the same results as for a firm which contracted construction and invested the funds in securities or retired outstanding debt. The firm constructing its own asset could have used the funds to retire debt or invest in marketable securities. The decision to invest in construction should not result in depressed income. Some difference will exist in the amount of interest capitalised. This is not only likely but appropriate. Interest paid by a contracting firm will reflect an allowance for risk. The constructing firm, as was argued previously, should use its borrowing rate or a default-free rate.

In the case of equity funds, it is necessary to recognise the implicit interest to secure comparable results for firms that undertake their own investment projects and those that contract their projects. The implicit interest item reflects the opportunity cost associated with the alternative use of these funds (either security investment or debt reduction). These funds can be used productively by the firm (or, alternatively, they can be returned to the owners), and have a cost that should be recognised.

If this method of treating the credit as revenue is followed, the accounting procedure advocated here is the same for the asset whether the funds are generated from borrowing or from equity capital. Such a procedure may require revenue recognition before realisation. In general, revenue should not be recognised until there has been a transaction giving rise to revenue realisation. However, the possible disadvantage to recognising the opportunity cost and revenue is outweighed by the harm done if the economic consequences of investing funds financed by stockholders are ignored.

Some implications

One immediate result of capitalising interest during construction would be to record assets self-constructed by a firm at values approximating the amounts that would be recorded were the construction contracted with payment at termination of the construction. This would increase comparability between firms in their total asset structure, their measures of income, and the resulting ratio calculations based on both sets of values. It would facilitate comparing the income statements of firms undertaking and not undertaking investments with long periods of construction. Firms which are otherwise identical should not have their revenues distorted by the amount and timing of their construction expenditures. This paper suggests procedures for minimising the distortion.

It can be argued that knowledgeable statement readers could adjust for differences in the costing approach used on self-constructed assets, given sufficient disclosure. The existence of efficient markets for widely traded securities assures that the variations in results occasioned by different recording procedures rather than differences in the economic substance of the underlying events, will not affect the market's evaluation given sufficient disclosure. Although the issue is an empirical one and, therefore, testable, we would expect the security prices of firms for which sufficient disclosure is not readily available to be affected. Agency costs (related to bond covenants, for example) may lead to economic effects and price changes.

To the extent that management decisions are influenced by reported income, say because of compensation plans for example, the failure to permit capitalisation of interest and the resultant depressing effect on reported income leads management to prefer deferred payments. This preference can result in higher contract prices, and a transfer of funds to the contractors (as they assume more risk). Capitalising interest eliminates the depressing effect on income and allows the arrangements with the contractor to be determined by economic substance, rather than the accounting effects.

Conclusions

Interest is a cost of construction and should be capitalised. When construction is contracted out and payment deferred the contract price will include an amount to cover the use of the contractor's funds. When the firm uses its own funds, interest on those funds is a cost of construction equivalent to the charge included in the invoice cost by a contractor. This is true whether or not debt capital is used to finance the project. Only through capitalisation of interest during construction will similar assets be recorded at similar values, independent of the accident of when the expenditures happened to be made. Only if interest during construction is capitalised will the similar operation of similar assets lead to similar income figures. Unequal investment outlays should not affect the incomes during the investment periods.

The amount of interest to be capitalised is obtained using the firm's borrowing rate or in situations where the firm has no debt outstanding, the rate that can be earned on government securities. For financial accounting, no allowance should be made for special risks assumed by the firm undertaking the project. The borrowing or lending rate is placed on an after-tax basis in order to recognise the tax deductibility of interest and the fact that common stock earnings are not tax shielded.

The usefulness of accounting as an aid in making predictions is reduced by the expensing of interest. Thus, income that is reduced to a loss by the fact that the firm is engaged in a large investment project that requires several years to complete (e.g. an oil pipeline) provides an inappropriate basis for forecasts. The act of investment should not depress income measures.

The importance of these issues lies in part in actions management may be motivated to take because of the perceived impact of the degree and form of disclosure. Capitalisation of interest increases asset values and delays recognition of the related expense. The failure to capitalise interest results in an incentive to contract the construction with deferral of payment.

The exclusion of interest during construction from assets and its inclusion in expenses results in incorrect income performance measures because revenues and expenses are not being matched. Failure to capitalise also understates the cost of increasing productive capacity and hence understates assets. Immediate time periods are penalised for expenditures made in the expectation of benefiting the future. Assets and income are understated now, and future income will be overstated. If the firm is in the better position to process this information rather than rely on disclosure and processing by individuals in the market place, interest (implicit as well as explicit) should be capitalised.

Costs may accrue if contracts are affected by interest capitalisation in ways unanticipated by the agents involved (e.g. bond covenants). Unless it can be shown that the market can obtain this information and process it more cheaply from other sources, firms should follow the interest capitalisation procedures suggested.

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The Impact of Size, Stock Market Listing, and Auditors on Voluntary Disclosure in Corporate Annual Reports*

Michael Firth

Annual reports are the major medium by which limited companies communicate information to outsiders. The content and form of annual reports is subject to certain minimum levels which are specified by the Companies Acts, the Accounting Standards Committee (see ICAEW, 1978) and, for listed companies, the Stock Exchange (Stock Exchange, 1973). Beyond these minimum levels companies can disclose a whole host of useful information, although in practice they stick very closely to the minimum levels (Firth, 1978b). The purpose of this article is to report on a study into the relationship of disclosure in corporate annual reports and three firm-specific characteristics that may, or may not, have some influence over the level of disclosure. These three characteristics are the size of the company, whether it is listed on the United Stock Exchange, and the firm of accountants engaged in the audit.

The research design involved the construction of a list of items that are, or could be, included in an annual report. Financial analysts working for stockbrokers and investment institutions were then asked to weight these items in terms of importance. The weighted list was then applied to a sample of annual reports and a disclosure index was calculated for each one. From this analysis the following questions were tackled:

(a) does the size of a company have any impact on or association with its level of disclosure?
(b) is there any difference in disclosure levels between companies with stock exchange quotations and those without? and
(c) does the firm of auditors have any impact on or association with the level of disclosure?

Some research into this topic has been undertaken in the USA although conflicting results have been reported. Buzby (1975) found that the extent of disclosure was positively associated with the size of a company's assets and was not affected by whether the firm was listed or not. This contrasts with the earlier study by Singhvi and Desai (1971) who found that the listing status (quoted or not quoted) was a major explanatory variable in accounting for the disclosure level. They also found a relationship between higher levels of disclosure and (a) greater asset size (b) greater number of shareholders (c) large (as opposed to small) auditing firms (d) higher rates of return (defined as net profit to net worth) and (e) higher earnings margins (defined as net profit to net sales). Cerf (1961) also derived a disclosure index which was applied to annual reports and he found that asset size, number of shareholders, and listing status were all positively associated with disclosure levels.

The impact of size, share listing, and auditors on disclosure levels

Size

A number of reasons have been put forward supporting the idea that larger firms will tend to give greater financial disclosure (Buzby, 1975; Singhvi and Desai, 1971). One reason is that collecting and disseminating information is a costly exercise and perhaps it is the larger firms who can best afford such expenses. Large firms are quite likely to collect the information needed for corporate report disclosure for their internal management systems and hence little extra cost may be incurred. A second reason is that larger-sized firms tend to be listed on the Stock Exchange and they may go to the stock market for finance more often than smaller firms; if firms have a greater reliance on the stock market for financing they may find it in their interest to disclose more in their annual accounts. This is covered below in the discussion of the possible impact of a stock market listing. Another reason that has been put forward is that smaller firms may feel that fuller disclosure of their activities will put them at a competitive disadvantage with other, larger, companies in their industry. Hence they may disclose less information than larger firms. Large firms tend to be more in the public eye and attract more interest from Government bodies, and they may therefore disclose more thinking that this will allay public criticism or Government intervention in their affairs.

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*The author expresses his gratitude for the helpful comments of Professor K. Peasnell.

Two measures of size were used in the study. These were sales turnover and capital employed.

Share Listing

Companies who obtain a listing on the United Stock Exchange have to comply with certain regulations regarding disclosure of financial information (Stock Exchange, 1973). This means their minimum disclosure requirements are somewhat higher than other, non-listed, companies. However it has been argued that listed companies are likely to give extra information in their annual reports, anyway. This is because listed companies like to have as favourable a share price as possible, in order to help financing, and greater disclosure may be felt to give more confidence to investors. Studies elsewhere have shown that there is some positive association between greater disclosure and reduced riskiness in a company's share price (Firth 1978c; Singhvi and Desai, 1971). Certainly listed companies receive far greater press coverage and demands for more information are almost inevitable.

Accounting Firm Acting as Auditors

The primary responsibility for preparing the annual report rests with the company. However the company's auditors may exercise some influence or provide some advice regarding the level of disclosure to give. Specifically it could be argued that larger, more well known, auditing firms may be able to exercise greater influence and hence they may be associated with higher disclosure levels. In order to see if there were any discernible relationships the auditor variable was included. Singhvi and Desai (1971) found that larger firms of auditors were significantly associated with greater levels of disclosure.

Other Variables

Singhvi and Desai (1971) used three additional variables in their study, these being number of shareholders, rates of return, and earnings margins. All these were significantly associated with disclosure levels although they added little to the explanatory power of a multivariate model (which showed the listing status to be by far the most important). None of these variables was examined in the present study. The number of shareholders variable is highly correlated with size and hence its relationship with disclosure levels is likely to be similar to that of size. No hypotheses could be put forward for suggesting that rates of return and earnings margins should be associated with disclosure levels and so these two variables were not included in the analyses. Additionally Moore and Buzby (1972) have suggested that earnings margins, rates of return, asset size and the number of shareholders are all likely to be interrelated and hence true associations may be difficult to arrive at.

Research design

List of Items

The first step in the research design was to construct a list of items of information that appear, or could appear, in corporate annual reports. A review of the relevant literature (e.g. Anderson, 1962; Backer, 1970; Bradish, 1965; Buzby, 1974, 1975; Cerf, 1961; Chandra, 1974; Choi, 1973; Horngren, 1970; Pankoff and Virgil, 1970; Singhvi and Desai, 1971) was made in order to select the items to be included in the list. Although this list was not exhaustive it did contain those items most frequently mentioned in the accounting press as being useful for investors and bankers. A review of several recent company annual reports and discussions with various users of accounts was also used in order to refine the list. Finally the list was subjected to two criteria. The first is that the items should exclude those that had to appear in annual accounts because of statutory regulations (e.g. Companies Acts).[1] The reason for this criterion is that companies would almost certainly disclose this information. The second criterion is that the item was almost certainly bound to be present in a company. For example manufacturing firms (which make up the sample) engage in research and new product development and they can therefore publish a narrative summary covering this, if they so wish. Any companies which definitely did not have anything to do with the items were omitted.

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[1] A few items (e.g. numbers 1 and 2 in Table 2) were covered by the Companies Acts but they were included as the wording in the Acts is 'loose' (e.g. as respects 'materiality') and many firms do not comply. Additionally some items are included which are covered by Statements of Standard Accounting Practice (SSAPs), published by the Accounting Standards Committee, and are therefore supposed to be reported on by companies. As some companies do not follow certain SSAPs and as many SSAPs are considered to be important by investors, these items have been included.

Importance of Items

Although we now have 48 items of information (see Table 2) it is quite likely that some are of more importance to the users of accounts than others. In order to take this into consideration 'importance' weightings were attached to the items. This was done by sending the list of items to users of accounts and asking them to evaluate the importance of each item using a five point scale (the covering letter sent out to the financial analysts is shown in the Appendix). Assigning the score of 5 meant the item was very important, the score of 4 meant the item was important, the score of 3 related to moderately important items, the score of 2 related to slightly important, and the score 1 meant unimportant.

The list was sent to a total of 120 financial analysts working for stockbrokers and investment institutions. 46 replies were received which represents a response rate of 38.3%. Although the response rate is quite reasonable when compared with other studies it is possible that there is some non-response bias (i.e. that the results from those responding may not be truly representative of the whole population). To examine whether there was any significant non-response bias present, a test suggested by Oppenheim (1966) was employed. This involved examining whether the mean scores for each of the 48 items for the first ten questionnaires returned were statistically different from the mean scores for each of the 48 items for the last ten questionnaires returned. The results of the t test, which examined for differences in group means, are shown in Table 1. As can be seen there were few significant differences and the signs of the t values were equally split between positive and negative. Hence there is little significant non-response bias and this suggests that the results of the study can be generalised.

Table 1
Non-Response Bias: Results of t Test

Number of items	48
*Number of significant differences in mean scores**	2
Positive t statistics	24
Negative t statistics	24

*Where the t statistic was significant at the 0·05 level.

The questionnaire containing the 48 items was sent to financial analysts as they are one of the major types of user of accounts and they are in a good position to evaluate the importance of the items. Previous research has shown that the weightings applied by financial analysts were very similar to those applied by bank loan officers, who are another major type of user of accounts (Firth, 1978a).[2] Thus the results of the study would be similar even if the weights of bank loan officers were used in evaluating the importance of the items.

A list of the 48 items and the weightings attached to them is shown in Table 2; the list has been prepared in the order of relative importance. The higher the score the greater the importance that that item should appear in the annual report. The 'breakdown of sales and earnings by product lines, customer classes and geographical location' proved to be the most important item to be disclosed and the 'historical summary of price range of ordinary shares in past few years' proved to be the least important.

As a general rule, historical accounting data tended to receive fairly high importance weightings. Forecasts of the future (e.g. forecast of next year's profits and cash projections for the next one to five years) received 'moderate' to 'important' scores—this suggests that financial analysts were placing some doubt on the accuracies of such forecasts. However the mean scores and relative rankings of forecasts were higher than those found in the USA (Benjamin and Stanga, 1977; Buzby, 1974, 1975; Chandra, 1974).

The Corporate Report (ASSC, 1975) recommended that a number of additional statements should be included in the annual report. These statements were included in the list of items (see items 18, 24, 30, 40, 41, 44, 45) and quite high scores were recorded for 'statement of company objectives', 'statement of value added' and 'a statement of transactions in foreign currency'. Although few such statements have appeared in practice, financial analysts appear to be very interested in seeing such information.

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[2] This contrasts with the USA, however, where Benjamin and Stanga (1977) found that there were significant differences between chartered financial analysts and bank loan officers in their weightings of selected accounting items.

Table 2
Disclosure Index

Item Number	*Item*	*Financial Analysts' Weight*
1	Breakdown of sales revenue by major product lines, customer classes and geographical location.	4·82
2	Breakdown of earnings by major product lines, customer classes and geographical location.	4·82
3	Cost of goods sold.	4·71
4	Amount and detailed breakdown of expenses (beyond that required by the Companies Acts).	4·69
5	Breakdown of expenses for past year into fixed and variable components.	4·63
6	Statements of source and application of funds.	4·58
7	Information relating to capital expenditures (narrative and quantitative data on expenditure in past year and planned expenditure).	4·51
8	Information relating to research and development (including a narrative description of the progress with new product development, planned expenditures).	4·46
9	Share of market in major product areas.	4·46
10	Names and salaries of senior management.	4·42
11	Index of quantity sales.	4·41
12	Statement of accounting principles used in the preparation of the accounts.	4·40
13	Historical summary of important operating and financial data.	4·39
14	Discussion of the company's results for the past year.	4·27
15	Measures of the physical level of output and capacity utilisation.	4·26
16	Index of sales prices.	4·25
17	Functional responsibilities of senior management.	4·24
18	Statement of company objectives.	4·21
19	Specification of the method used to calculate depreciation (including depreciation rates).	4·21
20	Index of raw material prices.	4·20
21	Money value of firm's order backlog.	4·20
22	Inflation-adjusted annual accounts as supplementary statements.	4·16
23	Extent of dependence on a few customers.	4·08
24	Statement of value added.	4·04
25	Functional responsibilities of company directors and their major outside affiliations.	4·01
26	Statement of the rate of return required by the company on its projects.	4·01
27	Description of major products produced.	4·01
28	Information relating to advertising and publicity (e.g. expenditures in past year, future commitments).	4·01
29	Market value of inventory.	4·01
30	A statement of transactions in foreign currency.	3·99
31	Allowance for doubtful debts.	3·98
32	Discussion of the major factors which will influence next year's results including an indication of the firm's relationship to its industry and the economy.	3·96
33	Brief narrative history of the company.	3·95
34	Discussion of the impact of inflation on the financial results.	3·92
35	Information on major industry trends.	3·89
36	Cash projections for the next one to five years.	3·87
37	Current resale value of the firm's assets.	3·87
38	Number and type of employees.	3·69
39	Forecast of next year's profits.	3·67
40	Indication of employee morale (i.e. labour turnover, strikes, absenteeism).	3·55
41	Information on corporate social responsibility (i.e. attitude of the company, expenditures).	3·48
42	Summary of the age of debtors at the balance sheet date.	3·27
43	Description of major plants, warehouses and properties, including location, function and size.	3·27
44	A statement of money exchanges with the Government.	3·21
45	Amount expended on human resources (training, welfare facilities).	3·01
46	Number and type of ordinary shareholders (e.g. institutions, individuals).	2·51
47	Description of marketing network for finished goods.	2·48
48	Historical summary of price range of ordinary shares in past few years.	1·79

The provision of inflation-adjusted annual accounts as supplementary statements (as suggested by ED 18, ASC, 1976) received a fairly high score. This contrasts with the USA where Benjamin and Stanga (1977) and Chandra (1974) found that very low weightings were attached to inflation-adjusted accounts.

Sample Companies

The disclosure index, made up of the 48 items and their weightings, was then applied to the actual accounts of three samples of companies. These samples consisted of 40 companies with no stock exchange listing, 40 stock exchange listed companies who were paired with the unlisted companies on the basis of size and industry, and 100 stock exchange listed companies. The specific make up of the samples is given below.

In order to see if having a listing had any impact on disclosure levels it was necessary to compare the disclosure scores of a sample of listed companies against the scores of a sample of unlisted companies. In order to make the comparison valid, however, other factors had to be held constant and so care was taken to ensure that the companies in the two samples were of equal size and in the same industry. The two samples, testing for the importance of a stock exchange listing on disclosure, are:

(a) 40 manufacturing companies were randomly selected from the largest 120 companies, in terms of sales, appearing in Jordans survey of leading non-listed companies in the UK (1976). The reason for limiting the selection to the largest 120 was that below this level the companies became considerably smaller and it would be difficult to find a suitable matching-pair listed company.

(b) Companies with stock exchange listings were then screened to see if they matched the unquoted companies appearing in (a) above. The matching was done on two criteria, viz. (1) that the asset size and sales turnover of the listed company be within ±10% of the non-listed company, and (2) that the listed company be in the same industry as the non-listed company.

(c) A further sample was taken for use in testing the size and auditor relationships. This sample consisted of 100 stock exchange-listed manufacturing companies—these being every 10th company appearing in *The Times 1000* largest companies (Times Books, 1978). If the tenth firm was not a manufacturing firm, then the next manufacturing firm was used. The size of the companies involved ranged from over £3,500 million in terms of capital employed to just under £1 million.

Annual reports released in 1976 by the companies in the above samples were obtained. These reports were used both for measuring their disclosure levels and for extracting information on their size (turnover and capital employed) and their auditors.

Measuring the Disclosure Level

The next stage in the research design was to build a disclosure index for each of the sample companies. As explained earlier, each of the 48 items was thought to be present in every company and the study set out to see whether the information was disclosed. If an item was disclosed then the company received the weighted score (the weighted importance score for each item is shown in Table 2); if the item was not disclosed then the company received a zero score. The scores for the individual items for each company were then totalled. This total was then expressed as a percentage of the maximum score (which was 190.83) and this figure is known as the disclosure index for that company.

Results

Impact of Share Listing

Table 3 shows the mean of the disclosure indexes for unlisted companies and for listed companies. Both of the mean figures are low, showing that companies tend to give very little information above what they have to disclose under the Companies Acts (see Firth, 1978b, for a fuller discussion of this).

Two statistical tests were carried out on the data summarised in Table 3 to examine for the impact of stock exchange listing on disclosure indexes. These were a standard t test to examine whether the differences in group means were statistically significant, and a Wilcoxon matched-pairs signed-ranks test to examine if the disclosure rankings between listed companies and unlisted companies were significantly different (Siegel, 1956). The results of the t test showed a significant difference in group means at the 0.05 level of significance. The Wilcoxon matched-pairs signed-ranks test confirmed this result. Thus companies with a stock market listing made greater disclosure than those that did not have a listing.

Table 3

Impact of Share Listing on Disclosure Index Scores

	Sample 1 *40 Unlisted Companies*	*Sample 2* *40 Listed Companies*
Mean	13·69	18·93
Standard Deviation	1·98	2·98

The sample means were significantly different at the 0·05 level.

Impact of Size

The association of size and levels of disclosure was measured by Kendall's rank correlation coefficient (tau) for each of the three groups (see Siegel, 1956). The results of the tests are shown in Table 4. These show that there is a positive association between size, whether measured in terms of sales turnover or capital employed, and levels of disclosure for all three samples. The table shows that the probabilities of obtaining the tau values by chance are very low and hence we can be confident that there is a significant association. The tau value is greater for sample 3, containing the group of 100 companies, and this is to be expected as samples 1 and 2 contained companies with a limited size range. The results are consistent with those derived in the USA (Buzby, 1975; Cerf 1961; Singhvi and Desai, 1971), i.e. the larger the size of the company the greater its level of disclosure. This applies whether a company has a stock exchange listing or not.

Impact of Auditors

The auditors of each company in the three samples were extracted and they were categorised into those in the so-called British 'Big 8' (Arthur Young McClelland Moores, Coopers and Lybrand, Deloitte Haskins and Sells, Peat Marwick Mitchell, Price Waterhouse, Thomson McLintock, Touche Ross, and Whinney Murray) and 'others'. Grouping of auditors by individual firms was not feasible as the numbers in each cell would have been very small and no statistical testing would have been possible. The statistical tests applied were the standard t test measuring differences in group means and Wilcoxon's matched-pairs signed-ranks test. The results of the t test are shown in Table 5; this showed that there was no significant difference in the disclosure scores between 'Big 8' audited companies and those audited by smaller auditing firms, for any of the samples. The Wilcoxon matched-pairs test employed on samples 1 and 2 was significant at the ·48 level. This very low level of significance confirms the t test results, i.e. auditors appear to have very little influence on the levels of disclosure made by companies in their annual reports.

Table 4

Impact of Size on Disclosure Index Scores

	(1) *Size—Sales Turnover*		
	Sample 1 *40 Unlisted Companies*	*Sample 2* *40 Listed Companies*	*Sample 3* *100 Listed Companies*
Tau	0·474	0·543	0·701
Probabilities of obtaining tau scores by chance	0·00003	0·00003	0·00003
	(2) *Size—Capital Employed*		
	Sample 1 *40 Unlisted Companies*	*Sample 2* *40 Listed Companies*	*Sample 3* *100 Listed Companies*
Tau	0·510	0·539	0·681
Probabilities of obtaining tau scores by chance	0·00003	0·00003	0·00003

Table 5

Impact of Auditor on Disclosure Index Scores

(1) *Sample 1* *40 Unlisted Companies*

	Big 8 Auditors	*Other Auditors*
Mean	13·84	13·59
Standard Deviation	1·37	1·57

No statistically significant difference in group means at 0·05 level.

(2) *Sample 2* *40 Listed Companies*

	Big 8 Auditors	*Other Auditors*
Mean	19·24	18·55
Standard Deviation	3·01	2·89

No statistically significant difference in group means at 0·05 level.

(3) *Sample 3* *100 Listed Companies*

	Big 8 Auditors	*Other Auditors*
Mean	19·81	19·73
Standard Deviation.	3·26	3·14

No statistically significant difference in group means at 0·05 level.

This contrasts with Singhvi and Desai's research in the USA where they found a positive association between 'Big 8' auditors and levels of disclosure.

Conclusion

The research set out to examine whether the level of disclosure in corporate annual reports was associated with the size of the company, whether it had a stockmarket listing, and who its auditors were. It was found that both the size and the stock market listing variables were related to disclosure but the auditor factor had no impact at all. Companies with stock market listings released significantly more information than companies that were unlisted. Listed companies are much more in the public eye and they rely on the stock market for financing; because of this they tend to make greater disclosure as they think that this will lead to greater investor confidence. Larger sized companies also tend to make greater disclosure in their annual reports. This is likely to be the result of a combination of factors, two of the major being that it is relatively cheaper for them to collect and disseminate information, and that they are more in the public eye and need to keep the confidence of regulatory bodies. Auditing firms have to express an opinion as to whether companies have complied with the minimum disclosure requirements of the Companies Acts and of the ASC's *Statements of Accounting Practice* (ICAEW, 1978), but beyond this there is no evidence that increased or decreased disclosure is associated with whether the auditing firm is from the 'Big 8' or not.

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Appendix

The enclosed questionnaire lists items which could be presented in the annual report of a manufacturing company. You are requested to examine each item and attach a weight to it reflecting how important you think it is that it appears in corporate annual reports. You should consider yourself as making a decision as to whether to invest in a firm. The weights to be used are

5 where the item is very important
4 where the item is important
3 where the item is moderately important
2 where the item is slightly important
1 where the item is unimportant

Please place your view of the importance weighting in the column headed 'weighting' opposite each item. Consider the firm concerned as being quoted on the United Stock Exchange and that each item is 'material' or significant.

In assigning the weights remember that the reporting of each additional item of information involves a cost to the company. Please note that there is no requirement that you should assign an equal number of weights.

Fixed Asset Values: Ideas on Depreciation 1892-1914

J. Kitchen

At the present time, when accountants and businessmen are struggling to move towards a coherent system of current value accounting, it is salutary to recognise that in the seminal development of accounting ideas in the last quarter of the 19th century, accounting literature was concerned with *values*. This concern continued at least up to the outbreak of the First World War, and the patient researcher does not find, in the pre-1914 literature, conscious limitation of the aims or functions of financial reporting (for the generality of commercial and industrial companies) to the provision of a balance sheet intended as no more than a historical record of the utilisation of proprietors' capital.

For fixed assets at least, most of the problem areas with which we are familiar today under headings like 'value' and 'depreciation' can be identified in discussion in the 1880s and before. It was one of the objects of an earlier essay[1] to examine ideas and developments in this field up to the publication of Dicksee's *Auditing* in 1892. When the last decade of the 19th century opened, a good many far-sighted accountants were conscious of the need either to reconcile the differing opinions and attitudes to profit estimation and asset values then current, or to select from among them in such a way as to provide a workable and acceptable set of rules for accountants and businessmen to follow. It proved a difficult task. Dicksee attempted it, but did not achieve a sufficient measure of success. His comparative failure was the more serious because he was to become so influential and widely read. In the event, the convention became general of incorporating fixed assets in balance sheets 'at cost, less depreciation'. We can say with hindsight that by 1914 the 'historical cost model' had become established; but no contemporary accountant would have recognized it by that (or any similar) name, and its adoption had not been explicitly argued.

It is the object of the present essay to consider the development of ideas on 'value' and 'depreciation' in the years prior to 1914 by reference particularly to the work of Frederic de Paula and Percy Dewe Leake, whose writings followed Dicksee's and who, like him, were influential then and later.

Edwin Guthrie's lecture of 2 April 1883

Before we turn to de Paula and Leake, however, it will be convenient to note briefly what Edwin Guthrie had to say in the course of his lecture on 'Depreciation and Sinking Funds' to the then recently formed Manchester Accountants' Students' Society in April 1883. When the Dicksee essay was published, limitations of space required the elimination of all but a mention of Guthrie, but his lecture was an impressive one.[2] Guthrie was speaking a few months after Joseph Slocombe's lecture,[3] from which the Dicksee essay included quotations. Guthrie had been one of the original members of the Council of the Institute of Chartered Accountants in England and Wales named in the Royal Charter, and had a substantial practice in Manchester, with a New York office from 1885.[4] He was a man of parts, and amongst other things was at one time President of the Manchester Statistical Society, and Chairman for 15 years (from its formation in 1889) of the Finance Committee of the Lancashire County Council.[5]

Guthrie's was probably the first fully reported lecture by an accountant which was confined to the subject of depreciation. Slocombe, in his references to depreciation, had concerned himself with commercial accounts, and primarily with manufacturing and trading companies. Guthrie did the same, noting that at liquidation there was 'no difficulty in finding the precise ultimate result of the operations'. However, for interim results (yearly or half-yearly) a manufacturer's costs would include the services of machinery and buildings which 'are consumed over a number of years'. And '...from year to year, neither the precise value consumed, nor the residue of value carried on from year to year, is exactly measurable'. He therefore required to assume 'a certain term of useful existence' for the machinery or building, which he called its 'life'.

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[1] 'Lawrence Dicksee, depreciation, and the double-account system' in *Debits, Credits, Finance and Profits*, eds H. C. Edey and B. S. Yamey, Sweet and Maxwell, 1974, 109–130. Referred to hereafter as the 'Dicksee essay'. Gee & Co., London, published Dicksee's *Auditing* and most, if not all of his other books. The 1892 edition of *Auditing* was reprinted in 1976 by Arno Press, New York.

[2] *Accountant*, 21 April 1883, 6–10.

[3] *Accountant*, 16 December 1882, 9.

[4] *Accountant* of 15 January 1887, 31 reported a meeting in New York on 22 December 1886, with Guthrie in the Chair 'to consider the desirability of forming an Institute of Public Accountants in the City and State of New York'. The meeting 'upon due deliberation' having deemed it desirable, a Committee was formed with Guthrie the first named.

[5] *Accountant*, 3 September 1904, 236.

Guthrie dealt with leasehold expenditures on an interest-adjusted basis, but observed that for plant 'the ratio of diminution of realisable value is greater in the earlier... years...' He accordingly favoured the principle of applying a 'rate of discount upon the diminishing annual value' which was to be arrived at 'after prudentially assessing the residual value'. However, he observed:

> Manufacturers and traders do not construct business premises or lay down special plant in the intent of a short period. It would seldom pay to do so. A large irrecoverable outlay is generally expended...and unless speedy destruction overtakes any certain business, the method of treatment for annual accounting is as of a 'going concern'. ...Manifestly the career of the business contemplated must have an assumed term, and the cost of the consumption of machinery and other erections must be attributed to the whole term assumed.

Guthrie added:

> For fuller occasional satisfaction, prudent manufacturers will periodically call in professional valuers...to value their plant and machinery, not necessarily annually, but perhaps every three, seven, or ten years, according to the nature of the case. But every valuation so taken...should be made with regard to normal cost rather than to the value on the day of valuation. Matter and things fixed in a permanent working position must not be treated in account as following the fluctuations of the market, for it is not a trading item which is in question...which can be sold any day without interruption to the works. Such a valuation is for purpose of check, and for ascertaining that a fair proportion of capital outlay is being brought into account to return the value expended within the period of its remunerative exhaustion.

Guthrie favoured prudence ('the higher rather than the lower rate...') in uncertainty, remarking,

> On the other hand, to introduce into profit and loss account too great a charge for depreciation may be as disastrous as the making of too small a charge, for by so doing, selling prices...may be fixed so high as to prevent the necessary volume of business.

Guthrie, in his lecture, favoured the charging of all repairs direct to profit and loss, but was prepared, where renewals and repairs were incurred irregularly, to capitalise them and 'rate the charge for depreciation proportionately high...', so as to 'distribute the true cost truly over the whole term, and prevent irregularity of charge...'. For the accounts, he recommended 'a combined account' to exhibit both the totals of 'the principal account' and 'its account for depreciation', and he included a comprehensive 'Table of Capital Items subject to charge for Depreciation and Redemption, with general range of Rates and Remarks thereupon'. Annuity, fixed percentage on diminishing value, and straight-line methods were included, the last not under that name but as '... divide [by] the number of years of the full term of life or shorter estimated period of value'.

Edwin Guthrie's references to the calling in of professional valuers (every three, seven, or ten years) 'for purpose of check' must be noted. We may note also that prices in general had been falling steadily from about 1873: the fall was to go on to about 1886, whereafter a less noticeable decline in prices continued to about 1896.[6] We may justifiably regard Guthrie as concerned with *values*, and accept the implication that he considered a value for annual accounting calculated on original cost less depreciation to be a reasonably adequate surrogate, at least in the short-term, for current value ('as of a "going concern"') given periodical checks made with the help of professional valuers or otherwise; remembering always the inclination evident in his lecture, in his consideration of fairly long-lived plant, to ignore merely ephemeral changes ('valuation...should be made with regard to normal cost rather than to the value on the day of valuation').

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[6] See, for example, *Abstract of British Historical Statistics*, Cambridge University Press, 1962, 476–7, which gives figures *inter alia* for Board of Trade Wholesale Price Indices, 1871–1938.

Second thoughts on going-concern values?

In 1892, while Dicksee was clear in his statement that 'the results of fluctuations [should not] affect the profit and loss account',[7] he accepted that fluctuations 'in value caused by external circumstances [need to be taken into consideration] when property changes hands'.[8] Dicksee saw a revaluation in such circumstances (or upon a change of proprietorship following some other similar circumstance such as the death of a partner) as requiring to be based on value 'as a going concern', and he took this to imply 'at such a value as [the assets] would stand in the books if proper depreciation had been provided for.'[9]

By the time the seventh edition of Dicksee's *Auditing* appeared in 1907, he had changed his definition of going-concern value (above) to

> at such a price as a willing purchaser would be prepared to give... [that] is to say, the assets should be written down from time to time to provide effectively for depreciation.[10]

Such a change seems clearly to negate any suggestion of an over-ready acceptance on Dicksee's part of balance sheet values based unthinkingly on original cost less depreciation; and, bearing in mind the general tone of his discussion in the 1892 edition, we can take it that Dicksee's change of definition here represented more an attempt to clarify his earlier ideas than an indication of any radical change in them.

As early as 1904, in *Auditing*'s sixth edition, Dicksee had inserted an additional paragraph under the heading 'Principle in Valuation of Assets' before turning to the 'Valuation of So-called Permanent Assets' ('Fixed Assets' in later editions). This paragraph ran:

> In the great majority of cases there can be no doubt that the position of affairs can be more readily and clearly disclosed by a single Balance Sheet than by accounts kept upon the Double Account System. In the case of companies, however, there is a further point to be considered, namely, that there are increases which are not divisible profits, and losses which (as a matter of law) need not be made good before dividing profits in the form of dividend. The Profit and Loss Account must obviously be framed so as to show the divisible profits, and the question thus remains to be considered how profits and losses that do *not* affect Revenue—or, to put it another way, capitalised fluctuations—are to be treated. As a matter of book-keeping, it is clear that two courses are open. Either the capitalised items must be disregarded in the Balance Sheet by misstating the value of an asset or a liability, or some account must be raised to record the profit or loss that is not taken to Revenue. If the latter course be adopted, the accounts should be sufficiently clear to explain what has been done: in the former case, if the assets are overstated, it is also necessary that mention should be made of the fact, as the assets appearing in a single-account Balance Sheet are *prima facie* assumed to be stated at a reasonable valuation. If, however, a profit has been made which is not available for distribution, it is often considered unnecessary to modify the accounts so as to disclose the circumstance. This point, however, is discussed more fully under the heading of 'Secret Reserves.' As a general rule, the amount at which *all* assets are stated in the Balance Sheet—except where a special statutory provision to the contrary obtains—should be regulated by the realisable value of such assets on the basis of a going concern. It may, however, be added that there are certain classes of undertakings in addition to those provided for by statute, to which the application of the Double Account System is not inappropriate—e.g. mines, collieries, speculative syndicates and other concerns of an essentially non-permanent character.[11]

Given the then current attitudes to the setting-up and use of secret reserves, Dicksee's paragraph looks like a final and broadly acceptable clarification until we note the further paragraph (below) which in editions from the ninth onwards (i.e. from 1912) appeared directly following that just quoted:

> Upon several occasions the writer of leading articles in the 'Commercial Supplement' of *The Times* has very definitely expressed the view that the values attached to items appearing upon the assets side of a Balance Sheet ought to represent a *bona fide* estimate of the amount that these items would realise in the event of a forced sale. With all respect to a venerable newspaper, it is submitted that this assertion

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[7] *Auditing* (1892) 121.
[8] *Op. cit.*, 120.
[9] *Ibid.*
[10] *Auditing* (1907) 199.
[11] *Auditing* (1904) 210.

> shows an entire misapprehension as to the real functions of a Balance Sheet. A Balance Sheet is intended to show the position of affairs of a continuing business at a given moment of time; and its function is, it is submitted, chiefly to prove the reasonableness of the apportionment of income and expenditure as between one year and another, and also to show the financial position of the business—i.e. the resources it has available to meet its current liabilities. It is not, it is submitted, a statement of affairs prepared to show debenture-holders, or mortgagees, what might be regarded as the minimum value of their security in the event of a forced realisation; but rather what may fairly be regarded as the position upon the assumption that the business is *not* about to be wound up, but intended to be continued. It is obvious that there must necessarily be a very vast distinction between the valuation of fixed assets under these different circumstances, and that so far as these assets are concerned, so long as it is reasonable to assume the continuity of the business, the correct thing is not to attempt to show the realisable value (which may be considerably more, or very considerably less, than the original cost), but rather to show such expenditure *as* expenditure, subject to the fact that in so far as it will not last for ever its cost must be apportioned as fairly as possible, and charged against the profits earned in successive years, in order to arrive at the true working expenses and the true net profit of each year.[12]

Since these two paragraphs continued to appear one after the other through *Auditing*'s successive editions at least until the fourteenth edition (1928) which was the last to be published during Dicksee's life, we must either regard them as in conflict with one another,[13] or we may presume that Dicksee had good reason to regard them as compatible. We may accept them as compatible on one condition only, namely that Dicksee saw an 'original-cost-less-depreciation' value as being (and likely to continue to be) closely representative of likely 'current' values such as would meet his understanding of going-concern value defined as the 'price...a willing purchaser would be prepared to give...' for the property for use in the context of 'a going concern'. Such a condition could be expected to apply while prices for the asset(s) concerned and tastes and techniques generally remained relatively stable.

Frederic Rudolf Mackley de Paula, CBE

Frederic de Paula was about eighteen years younger than Dicksee. De Paula had qualified (ACA) in 1906, after passing his Intermediate and Final examinations 'with honours', and he had gone into practice shortly thereafter. By 1913, his firm was established as de Paula, Turner, Lake and Co. and he continued in practice until 1929. For three years prior to that date he occupied the part-time Chair of Accounting at LSE which Dicksee had vacated on his retirement in 1926. De Paula resigned his Chair and his partnership together when he went as Chief Accountant to the Dunlop Rubber Company in December 1929, later becoming that Company's Financial Controller. At Dunlops he acquired a considerable reputation in the business world and in the accountancy profession as a pioneer in working towards the publication of more informative company accounts.

Frederic de Paula had served with the Ministry of Munitions and for a time as a Lieut.-Colonel in France during the First World War, and he worked also in the War Office (with the equivalent rank of Major-General) at the beginning of the Second World War, again concerned mainly with the supply of munitions. He left Dunlops at the end of 1941 to join the board of Harding, Tilton and Hartley (later the British van Heusen Coy.) and he became its chairman and served also on the boards of other important companies.[14]

Perhaps de Paula's special distinction from the point of view of the development of accounting ideas was his accession to the Council of the ICAEW in 1943 as its first non-practising member. In 1942, when the Taxation and Financial Relations Committee (now the Technical Advisory Committee) was set up, de Paula was installed as Vice-Chairman. He became Chairman of that Committee upon his election to the Council, resigning in 1945 when he retired. He retained his membership of the Council until 1950. De Paula brought Stanley W. Rowland (Dicksee's partner and for many years lecturer at LSE) with him to the T. and F.R. Committee as its Secretary, and it was at the first meeting of that Committee that the decision was taken to request the Council's permission to the Committee's making the attempt to draw up a code of accounting principles. The Council agreed, and the *Recommendations on Accounting Principles* followed. De Paula was also a member of the Carr-Saunders

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[12] *Auditing* (1912) 194.

[13] Dicksee essay, 128.

[14] See (e.g.) *Accountant*, 18 December 1954, 669 and 705.

Committee on Education for Commerce which reported in 1949.

De Paula's career as teacher and writer in Accounting had much in common with Dicksee's. Like Dicksee he began with lectures to the London Chartered Accountants' Students' Society, and, like Dicksee again, his principal publication was a major nook on auditing. *Principles of Auditing* first appeared in 1914, and had run to eleven editions by 1951, three years before his death.

Frederic de Paula was important and influential both within the accountancy profession and outside it, active as an innovator and with wide experience in the application of the principles with which he was concerned. From his earliest years after qualifying he was involved with students and the teaching of accounting, and we have a record of a lecture he gave successively to the Hull, Leeds and Nottingham C.A. Students' Societies in 1911 and 1912.[15]

The Dicksee essay has already noted[16] that some of Dicksee's contemporaries and successors were more categoric in confining balance sheet values to original-cost-less-depreciation than Dicksee himself. Frederic de Paula was an important case in point in the Students' Society lecture referred to. He said

> ...in writing off depreciation, no regard need be taken to fluctuations in the market price of similar plant, whether such price be either up or down. The particular plant is held as a fixed asset, and is not held with a view to re-sale, but with a view to earning income by the use thereof during its working life. Therefore, as a going concern, all that is necessary and all that is essential is that the net cost should be written off over the working life. If the market price is up it will not add one day to the working life of the particular plant, but, if the price maintains, when the plant has to be renewed an increased price will have to be paid. On the other hand, if the price is down when the plant is renewed a smaller sum will be required than was the case with the original plant. So that it will be seen that the *earning capacity* of the particular plant is absolutely unaffected by the market price of similar machinery, and that therefore this factor can be disregarded.[17]

This sounds categoric enough, but it was not, in fact, an adequate statement of his views. Thus, in 1914, in the first edition of his *Principles of Auditing* he wrote,

> For commercial purposes,...assets are valued according to certain conventional rules, and the profit or loss arrived at in this way *is considered sufficiently near and accurate for ordinary business purposes*...[18]

and he then set out the valuation convention used in his earlier lecture, thus

> Fixed assets are valued on the basis of cost, and if such assets are of a wasting nature, the original cost price in most cases is written off to revenue, by means of depreciation over the period of the estimated working life of such asset[s]. At any intermediate date, therefore, the fixed assets will appear in the Balance Sheet at cost, less the depreciation (if any) written off to date, and this represents the present value of such assets to the particular undertaking as a going concern, or, in other words, the value of such assets to the proprietors of the particular business. Current market value and break-up value are disregarded, as these do not affect the working lives of the particular assets at all...[19]

Here again, a conflict between two successive statements is capable of practical resolution if we accept that de Paula was writing in a world of relatively stable prices and techniques. That de Paula was in no doubt about the significance of asset values is apparent from his remarks

> The main object with which a Balance Sheet is drawn up is to ascertain the profit or loss of the concern during a given period, though, in addition, it is of great value in showing the financial position at date, and whether the capital is intact or not, and how such capital is invested...

continuing,

> As the capital represents the surplus of assets over liabilities,...it will be seen that the ascertainment of the profit or loss is absolutely dependent upon the valuation of the assets.[20]

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[15] Reprinted in *Accountant*, 15 June 1912, 899-906.

[16] At 127.

[17] *Accountant*, 15 June 1912, 905/6.

[18] de Paula (1914) 70. My italics.

[19] *Op. cit.* 71.

[20] de Paula (1914) 67 and 68.

We shall return to de Paula's views in a later paragraph.[21]

Percy Dewe Leake

In referring to the work of P. D. Leake, we may usefully note that he was almost exactly Dicksee's contemporary. Leake qualified (ACA) in 1886, as did Dicksee, and went straight into practice, remaining senior partner in P. D. Leake & Co. until his death in 1949. *The Times*, in an obituary, described him as 'an eminent chartered accountant and a prolific writer on practical economics and accountancy, especially in connection with joint stock companies.' *The Times* noted that Leake had an extensive practice in auditing the accounts of important companies, that his writings had attained a wide reputation throughout the accounting world, and that he had been frequently called upon as an expert witness in the Courts.[22] We shall refer to one important such case, namely his retention by the Postmaster-General to give evidence in 1913 in the case of the National Telephone Co. v. H.M. Postmaster-General.

Percy Leake wrote extensively in the field of business and asset values, depreciation and goodwill. His books were used by accounting students, but they were not general texts, being addressed to a wider audience within and beyond the accountancy profession and offering more extended discussion in his chosen area than students' general textbooks can allow. For our purposes, his most important books were *Depreciation and Wasting Assets and their treatment in computing Annual Profit and Loss*, which first appeared in 1912 and ran to five editions during his life, and *Balance Sheet Values* (1929, four editions during Leake's lifetime).

Leake liked to refer, on the title pages of his books, to his Fellowships of the Royal Statistical Society, of the Royal Economic Society, and of the Institute of Directors, and *The Times* obituary noted that he was 'much in request as a lecturer on economics before clubs and societies concerned with such matters.' As an accountant, he was certainly no dilettante; he had a passionate interest in education for the profession, and he left a large personal fortune in trust to the ICAEW for educational purposes in accounting and political economy.

Leake's *Depreciation* in 1912 was a more substantial work than Dicksee's book of 1903,[23] and it might have been presumed that it would have offered a fairly esoteric discussion of asset values for balance sheet purposes. But the fact was rather otherwise. Five years or more before his *Depreciation* appeared Percy Leake had coined a definition of depreciation ('expired capital outlay'[24]) which linked the residual values for his assets for balance sheet purposes firmly to original 'capital outlay' in most applications. Moreover, his lectures and his writing were primarily addressed to the problems of adequate rates of provision and systematic asset records, for which he was early in identifying a major practical need. He published a *Register of Industrial Plant for the Measurement of Depreciation*, and he argued strongly against the use of the Fixed Percentage on Diminishing Balance method at the rates then in common use. Like Dicksee's, Leake's general concern on depreciation centred to an important degree upon the dangers of its neglect by company boards and professional accountants.

Though he repeatedly asserted in the early part of his book, and through its later editions, that the 'subject of Depreciation... has hitherto received little or no systematic attention'[25], Leake's ideas on values were much in line with those of Dicksee and de Paula, though he did not refer to these writers. He quoted Henry Burton Buckley's tramway and Consols examples without acknowledgement under a heading 'Questions raised by legal writers'[26] and included references (with acknowledgements) to Buckley on company dividends and the *Lee* and *Verner* decisions.[27] We shall refer again briefly to these decisions of 1889 and 1894 later in this paper.

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[21] Another important writer at this time, and almost an exact contemporary of de Paula's, was Arthur Edwin Cutforth (Sir Arthur from 1938, and President of the ICAEW from 1934–1936). Cutforth was born in 1881 and was a partner in Deloittes from 1912–1938. He wrote several books including a popular text on *Audits* (Gee & Co., London), the third edition of which appeared in 1914. *Audits* did not offer a general discussion of values, but listed seven methods of providing for depreciation of which six were based on original cost. No examples of method seven were given, and it was not further discussed. The tenth edition of *Audits* was current when Cutforth died in 1958.

[22] *The Times*, 28 November 1949, 7.

[23] Dicksee's *Depreciation, Reserves and Reserve Funds* which appeared in 1903 excluded the general discussion of values which he had incorporated in *Auditing*. It was confined to some sections stressing the importance of provisions for depreciation on a sufficient and regular basis and to a review of methods for different classes of assets.

[24] See, for example, his lecture to the Institute of Directors in March 1907 under the title 'The Question of Depreciation and the Measurement of Expired Outlay on Productive Plant: A plea for the study and use of Better Methods.' Reprinted in *Accountant*, 20 April 1907, 528–541.

[25] e.g. at 1, 3, and 4.

[26] *Depreciation* (1912)13. For Buckley's examples see, e.g., the third (1878) and fourth (1883) editions of his *Law and Practice under the Companies Acts* at 415 and 459.

[27] *Op. cit.* 39–42.

On asset values, Leake saw depreciation as

> ... the fall in exchangeable value occurring during the whole period of use, this being equal to the difference between the original capital outlay and the ultimately realised scrap or remainder value. Depreciation of industrial plant is therefore accurately defined by the term 'expired capital outlay', being wholly unaffected by fluctuations in the market price during the period of its use.[28]

Leake favoured the straight-line method for charging depreciation, and it was on his arguments in favour of this method that he based his testimony in support of the Postmaster-General in 1913 when the latter was in conflict with the National Telephone Company about the payment to be made for large quantities of equipment, cables, and other installed material taken over by the Post Office. This case was decided too late for inclusion in the 1912 edition of *Depreciation*, but in later editions Leake included a chapter on what he called 'the then value' of plant, since in the National Telephone case, the agreement between the parties was for 'the then value' to be paid for plant taken over on the operative date. Leake's comments on the outcome of the case are of interest to us.

The Railway and Canal Commissioners, before whom the case was heard, gave judgement on the basis of '... the established mode of estimating value—namely by considering what it would cost ... to erect that very piece of plant less depreciation for the user by the Company.'[29] Judgement was entered in a sum of the order of £12½ millions and, as already indicated, Leake's remarks on the submissions apparently made for the PMG are illuminating. He reproduces alternative calculations of purported 'value' based on original cost with differing assumptions about length of asset lives. Leake arrives in this way at two 'values' (£14·3 millions and £10·8 millions) noting that these sums—based on original cost but calculated as indicators of 'the then value'—would be '*subject only to any fluctuation in the cost of material and labour which is understood to be a comparatively small sum*'.[30] This seems to confirm our impressions from Guthrie, Dicksee, de Paula and others that depreciated cost values prior to 1914 were generally regarded as good indicators of current values on the basis of a going concern.

While firm in his resolve to base expired capital outlay on original cost without regard for subsequent fluctuations, Leake did provide in *Depreciation* for allowance to be made for subsequent fluctuations in the value of materials and labour 'in so far as these may safely be taken as useful indications *in revising earlier estimates of the ultimate scrap values*'.[31] By the time he came to publish his *Balance Sheet Values* in March 1929, however, Leake was ready to recognise 'the still remaining effects of currency inflation'[32] resulting from the War and its aftermath, and he spoke of three distinct 'methods' in common use for valuing plant:

> The first method may be defined as the 'going-concern cost-basis value'. Either this, or the 'then-value', is the value at which industrial plant should always be carried in the accounts of a going-concern. The first is based upon the unexpired original capital outlay on plant (viz. cost), computed by deducting from cost, less estimated scrap value, an equal annual instalment in respect of each year of the estimated efficient life which has expired. The second method of plant valuation is the 'then-value', which is, as already explained, the 'going-concern cost-basis value' adjusted, *on sale to a new owner*, in respect of the subsequent fluctuations in the cost of material and labour, as bearing upon the possible price of new plant. The 'then-value' method is thus based strictly upon cost, and has no regard whatever to the amount of profits which the undertaking may be earning, or likely to earn. The third method of valuation may be defined as the 'going-concern profits-basis value'. In valuing industrial plant on this basis it is natural and almost inevitable that some regard is had to the degree of success enjoyed, and likely to be enjoyed, by the undertaking. The future prospects of the undertaking are taken into account, and thus the value of goodwill is, to some extent, reflected in a valuation made on this basis as suggested in the illustration given.[33]

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[28] *Op. cit.* (1912) 77.

[29] 29 TLR 195 (not quoted by Leake).

[30] *Depreciation*, e.g. 1948 edition, 165. My italics.

[31] *Depreciation* (1912) 7. My italics.

[32] P. D. Leake, *Balance Sheet Values*, 6. The fact that 'inflation' was dissipated by the 1929–32 economic crisis (the Great Depression) which came immediately after the publication of Balance Sheet Values could only have served to reinforce the common idea that taking one year with another, values based on original cost were probably good enough.

[33] *Op. cit.*, 14/15. My italics.

It is worth also noting an earlier reference which repeats Leake's view on balance sheet values, thus:

> If all the assets and liabilities are stated at their true going-concern values, the balance sheet will show the nearest possible approximations both to the appropriate value of the capital, and to the amount of the profit or loss arising within the year, or other accounting period then ended. It follows, therefore, that neither the capital nor the profit or loss can be correctly stated except by adhering strictly to going-concern values.[34]

Clearly for Dicksee, de Paula and Leake we can repeat our conclusion that up to 1914 at least they thought of 'going-concern' value as something to be arrived at on a basis of original cost less depreciation, and that they took the view that such a value was likely to be a good indicator of current going-concern value (Leake's 'then-value' or value-to-the-business in our day) in a period when prices, tastes and techniques were fairly stable. Clearly also the pre-1914 coincidence, at least the approximate coincidence, of these values was likely to weaken any anxiety of busy men to search about for a fuller analysis of going-concern values. De Paula's grasp seems the weakest of the three. For Dicksee and Leake we must note that when they spoke of going-concern values other than (e.g.) Leake's 'going-concern cost-basis value', their references were more in the context of sales to new owners or of other circumstances in which property was changing hands, than clearly and unequivocally in relation to the successive balance sheets of a single business entity. Long years of equating the term 'going concern value' with 'original-cost-less-depreciation' were to prove to have taken their toll of mental freshness, and it seems that what had, before 1914, been a useful common working hypothesis whereby reasonable indicators of value to the business could be had cheaply and easily, remained after 1914 in the minds of accountants generally—and in the minds of some important accounting thinkers, such as de Paula, Cutforth, and S. W. Rowland—long after the essential basis for such a working hypothesis (i.e., relatively stable prices) had passed. Some of de Paula's evidence to the Cohen Committee, to which we refer below seems to support this view.

Evidence to the Cohen Committee on values for fixed assets

When the ICAEW prepared their evidence for the Cohen Committee on Company Law Amendment in the later months of 1943, they were concerned, amongst other things, to secure increased disclosure in the published accounts of companies, to put an end to practices (by then no longer widely approved) involving the setting up and manipulation of secret reserves, and to secure the provision of group accounts in the reports of holding company groups. These objectives reflected a revolution since the middle 1920s in ideas about company reporting. Hitherto, companies legislation had not dealt with the purpose of a balance sheet. The ICAEW evidence of December 1943 included a paragraph (below) on the Function of a Balance Sheet, which the Cohen Committee accepted and repeated in paragraph 98 of their Report (Cmd. 6659):

> The function of a balance sheet may be stated briefly to be an endeavour to show the share capital, reserves (distinguishing those which are available for dividend purposes from those not regarded as so available) and liabilities of a company at the date as at which it is prepared, and the manner in which the total moneys representing them are distributed over the several types of assets in which they have been invested. A balance sheet is thus an historical document and does not as a general rule purport to show the net worth of an undertaking at any particular date or the present realisable value of such items as goodwill, land, buildings, plant and machinery, nor, except in cases where the realisable value is less than cost, does it normally show the realisable value of stock in trade.[35]

The ICAEW evidence sought to drop references to 'values' of fixed assets in previous legislation, and sought instead a requirement for a statement as to 'how the *amounts* at which fixed assets are stated have been arrived at'.[36] The proposal was accepted. In July 1944, eleven months before the issue of the Cohen Report, No. VIII of the ICAEW's *Recommendations on Accounting Principles* established as 'best practice' the showing of fixed assets in balance sheets 'at cost... [less] the aggregate of the provisions for depreciation...' (para 78).

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[34] *Op. cit.*, 3.

[35] ICAEW Memorandum of Evidence to the Cohen Committee, reprinted as Appendix Z(1) to the published Evidence (Day 13), 25 February 1944, 388.

[36] *Ibid.*

We have already asserted (para 1 of this paper) that the pre-1914 literature does not reveal any conscious limitation of the aims of financial reporting to the provision of a Balance Sheet intended as no more than a historical record of the utilisation of proprietors' capital. Such, however, is the underlying concept of the 'function of the balance sheet' incorporated into the 1947–48 legislation after the Cohen enquiry. Evidence given similarly to the Jenkins Committee reaffirmed this function. Indeed, the ICAEW had presented this same view of the primary purpose of accounts in paragraphs 1 and 2 of Recommendation N.15 in 1952, referring to it specifically as the 'historical cost basis of accounting' and it became, as such, the key-stone of the arch around which the Jenkins Committee's report was built as regards accounting matters.[37] We know that Recommendation N.15 was withdrawn in 1974 when PSSAP 7 was published. But we do *not* find in the pre-1914 literature support for the ICAEW's December 1943 paragraph on the function of a balance sheet on which were based the views of two Company Law Committees (Cohen and Jenkins) and N.15's remarks on such a fundamental matter as 'the primary purpose of annual accounts'.

It will be worthwhile noting here one reply by Sir Harold Howitt (senior partner of Peat, Marwick & Mitchell and a former President of the ICAEW) given in response to Qn. 6644 during examination before the Cohen Committee on 25 February 1944:

> We have had a suggestion that whilst recognising the book value of the fixed assets as an historical fact, the directors should be required each year to give a certificate that in their opinion the aggregate assets possess a value not less than the total shown in the balance sheet. What do you think of that suggestion?—(*Sir Harold Howitt*): No, I think it is impossible. An indication as to whether the assets as a whole are worth what they stand at is given by the earnings of the company and the market value of the shares. You cannot expect the directors to commit themselves to saying whether the individual assets or the assets as a whole are worth what they are stated at.

It will also be useful to look at four questions and their answers given by Frederic de Paula in his evidence to the Committee on 19 May 1944:

> 9863. Would you... agree that the Balance Sheet is a historical document which shows what expenditure a company has made, what provisions it has made, and that it does not attempt in any way to show the realizable value, the replacement value, or in fact the going concern value of the assets?—No, I say it does show the going concern value.
> 9864. I thought you agreed with the suggestion that the going concern value of the assets is dependent on the earning capacity?—The going concern value is represented by the cost of acquisition less a proper allowance for wear and tear. As to whether directors have invested capital wisely or unwisely will be shown by the earnings of those assets.
> 9865. So that you are not suggesting that in giving the certificate as to fair value the directors should make any computation based upon the profits?—None whatever; simply on what they spend, less a provision for reasonable depreciation of those assets that are wearing out. That is a fair going concern value which, I suggest, the directors should confirm.
> 9866. My difficulty is in the use of the words 'fair value,' because a fair value means a different thing, I suggest, to the shareholders than the interpretation which you are seeking to put upon it.—I have said, 'upon the basis of the undertaking continuing as a going concern'; I pin it to that.

Mr. de Paula's evidence seems to confirm our earlier assertion that established habits of thinking about going-concern values had outlived the conditions—relatively stable prices, etc.—to which they had been appropriate, and that their dependence for their usefulness on such conditions had been forgotten. De Paula clearly had in mind a definition of going-concern value equivalent to original cost less depreciation, though such a definition was no longer justifiable nor relevant in the 1940s, and he rejected the opportunity to explain or qualify it.

The narrow basis of the *Lee* judgement

It has been argued in the Dicksee essay[38] that Lindley LJ's *Lee* judgement was based on a structure of logic regarding the separation of capital and revenue accounts which was appropriate for railways and other entities adopting the double-account system but not for the generality of commercial and industrial companies. That essay noted that Ernest Cooper had brought out the differences between the single- and double-account systems, though he did not completely clarify the relationship of the *Lee* judgement (and the 1894 *Verner* judgement) to the general problem of capital and revenue profits and losses of commercial and industrial companies.[39] The *Lee* and *Verner* cases, and other judgements based on them (e.g. *The Natal Land* judgement of 1891) were concerned with decisions about what profits were distributable. Indications have already been given in the Dicksee essay of Dicksee's impatience in 1892 with the *Lee* decision. It is worthwhile to quote him further on this point:

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[37] Report of the Company Law Committee (the Jenkins Committee) 1962, Cmnd. 1749, para 333.

[38] *Op. cit.* 122–126.

> The recent decision in the case of *Bolton v. The Natal Land Company*, however unsatisfactory it may be in many ways, does much to relieve the Auditor from responsibility upon this point, it having been there decided that the defendant company were entitled to treat an assumed rise in the value of their lands as profit available for dividend. It would thus appear that there is no legal objection to a re-valuation of assets caused by a fluctuation (upwards) in value, and that, even where these assets are what the Court (few accountants would venture to make the distinction) has called Capital Assets, the resultant increase is profit available for dividend. The author knows of no case upon record in which a company has been compelled to make good out of revenue a fluctuation (downwards) resulting in a decrease in the Capital Assets of a company. It would thus seem (pending any fresh decision, which—in view of the conflicting decisions already upon record—might be looked for at any time) that a company has power to take advantage of a favourable fluctuation, but need not consider an unfavourable fluctuation; and that the question is one of discretion, not of principle, and—consequently—not within the sphere of the Auditor's functions.
>
> On the other hand, it would appear to follow, *a fortiori*, that there is, on the part of the management—subject, of course, to the approval of the shareholders—a discretionary power not to take advantage of a favourable fluctuation, and also to provide against an unfavourable fluctuation by reduction of, or by altogether postponing the declaration of, dividend.
>
> To put the matter more plainly—and, at the same time to arrive at a *reductio ad absurdum*—it appears to be entirely at the company's own option whether it bases its Balance Sheet upon facts or fancies, and whether it chooses to declare, or not to declare, a dividend upon either a profit or a loss. It must be admitted that this conclusion is somewhat startling; but it is a logical deduction from the present interpretation of the law.[40]

This impatience was unfortunate, because it seems to have been effective in helping to inhibit thinking (by Dicksee and his successors) in the area.

Percy Leake's reactions to the *Lee* and *Verner* judgements have much in common with Dicksee's. Leake dealt with these at pp. 39 to 42 of his *Depreciation* (1912): his conclusion was that 'fixed capital [also] should be kept up . . .', and that

> The legal doctrine as to the difference in the treatment of the fixed and floating assets, when the declared object of the Company is to sink its capital in wasting assets (called fixed capital), is doubtless necessary in order to protect the common commercial practice in the treatment of the accounts of collieries, mines, and other similar undertakings, where no serious attempt is made to ascertain and charge to the annual revenue account a proportionate part of the original cost of the diminishing mass of raw material. Thus the surplus balance of the annual revenue account, which is generally regarded as profit and distributed as dividend, includes, and may sometimes wholly consist of, exhausted capital outlay which has not been provided for out of revenue.

Here again the opportunity was missed of considering and drawing out the reasons why the common practice in the treatment of depreciation for collieries, mines and other similar undertakings might justifiably be regarded as differing in principle from that for ordinary commercial and industrial companies.

The legal decisions on company dividends have remained a jungle for accountancy students. We can only speculate how far that jungle might have been cleared had Dicksee and Leake discerned more clearly the particular relationship of the *Lee* and *Verner* judgements to special cases including companies for which the double-account system was appropriate, rather than to the generality of business entities. Had they done so, the legal judgements about dividends which followed the *Lee* and *Verner* cases (including for example the important *Ammonia Soda* judgement of 1918) might have been decided differently. As things have turned out, company lawyers of late years have increasingly warned that future judgements could be expected to follow more modern commercial practice and to insist on provision for depreciation on fixed assets before arriving at divisible profits. It is worth noting that the Jenkins Committee in 1962 recommended that (with some exceptions) provision for depreciation should be made compulsory. This recommendation is still unadopted, as is their recommendation that the effect of the *Ammonia Soda* decision should be reversed in legislation.[41]

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[39] Others saw these distinctions and relationships (for example, A. L. Hellyer whose lecture 'Depreciating Assets, Sinking Funds and Kindred Subjects' was reproduced in *The Accountant* of 29 July 1899, 809 et seq.) and the commercial and industrial circumstances to which the different models were appropriate. But they did not succeed in compelling the attention of the profession and the law to their arguments.

[40] *Auditing* (1892) 135/6.

We need to remember, however, that in criticising writers like de Paula, Leake and Dicksee, we are speaking of men who were running important practices as well as publishing major works and teaching (for Dicksee and de Paula at least) across the range of the discipline. Perhaps the failure of their analysis and its heavy costs in slowing the development of accounting ideas is an important consideration supporting the provision in recent years of improved research facilities and resources for accounting education.

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[41] Cmnd. 1749, para 350(a) and (c).

The Evolution and Revolution of Financial Accounting: a Review Article

T. A. Lee

The upheaval of recent events in financial accounting may have persuaded many accountants that these are uniquely critical times for their profession. However, to do so would be to view the present too narrowly and without a relevant context. The problems of accounting must be placed within a wider perspective, otherwise they may appear to be more troublesome than they deserve.

The most relevant context appears to be the historical one, in which the problems of today can be seen also to have been the problems of yesterday. In other words, they are long-lasting problems, and may not lend themselves to permanent solutions. The aim of this review article is to attempt to provide at least part of such a historical context by utilising material published in four texts from the second Arno Press collection.[1] It is largely concerned with events and activities at the end of the last and the beginning of this century, a period which, surprisingly, has been neglected by accounting historians despite its apparent importance in the development of contemporary financial accounting.

The texts of Chatfield and Hein will be used to describe some of the main problems facing the accountancy profession during the last two decades of the nineteenth century. This will provide the background to the material in Brief's text which reflects the state of accounting at the beginning of the twentieth century. Yang's more detailed text concentrates on a particularly long-lasting accounting problem and, together with the later material in Hein, provides evidence of developments from the earlier foundation. Each text will therefore not be reviewed in the conventional way but, instead, will provide witness to the longevity of financial accounting problems.

Present-day problems of financial accounting

The 1970s have seen accountants grappling with a number of seemingly vital issues. Arguably the most important of these is the establishment of acceptable accounting standards to improve the quality of reported financial accounting information by reducing the number of alternative practices and improving the relevance of accounting data. These include the vital measurement problems associated with accounting for changing prices and price-levels. A second significant issue has centred on the need for a conceptual framework for financial reporting—a matter strongly related to the accounting standards programme. Auditing standards (both technical and ethical) have constituted yet another important area of concern. And, finally, the qualifications of accountants (pre- and post-qualifying) have also been the subject of serious scrutiny and debate in the 1970s.

No doubt such a brief list could be enlarged and expanded. To do so, however, would be largely an irrelevance in relation to this paper. Suffice to say that major elements of each of these problem areas are to be seen in the writings being reviewed and, despite their age, appear to be as unresolved as ever. Of course the problems have become somewhat more sophisticated and complex but, nevertheless, they remain as 'critical' today as they were in the late 1800s and early 1900s. There is an evolution as well as a revolution in accounting matters which ought to be noted by those that currently seek speedy solutions.

Professional responsibility in the 1880s and 1890s

The writings reproduced in Chatfield are all excellent pieces which reflect the mood and attitudes of the times. They were written by the most eminent accountants of the day (many of whom founded the accountancy profession in its modern form)—for example, Cooper, Pixley, Whinney, Dicksee, Harmood-Banner and Crewdson. Their approach to accounting and auditing problems was consistent and reflects the newness of the profession at that time—that is, be optimistic yet realistic about the problems yet to be discovered let alone resolved. They were proud men, full of the self-confidence of the Victorian age, and splendid in their belief in their personal honesty and integrity. They were also noticeably worried about the lack of precedent and experience in matters relating to their professional responsibilities and of lack of public credibility in their work. For example, Crewdson commented in 1902:[2]

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[1] M. Chatfield, *The English View of Accountants' Duties and Responsibilities 1881–1902*, Arno Press, 1978; L. W. Hein, *The British Companies Acts and the Practice of Accountancy 1844–1962*, Arno Press, 1978; R. P. Brief, ed., *Selections from Encyclopaedia of Accounting, 1903*, Arno Press, 1978; and J. M. Yang, *Goodwill and Other Intangibles*, Arno Press, 1978.

> In plain English, while I believe there is today no profession the members of which believe more thoroughly in themselves and in the importance of their duties, or who as a whole do their work with a more elaborate conscientiousness, those who have the best opportunities of judging will admit that the public do not as yet greatly believe in us; and, on the other hand, in the effort to prove that our services are valuable, writers have sought to extend as far as possible the field of our operations, without regard to the liabilities which were thereby imposed upon us.

Given the 'youth' of the profession at that time, this position is not surprising. What is, however, is the just-as-evident present-day concern of accountants about the precise nature of their responsibilities (particularly those in the area of auditing), thus reflecting the almost continuous and unplanned chain reaction in UK accounting life of legal decision to accepted professional practice to legal decision; and the failure to resolve these matters on a long-term basis.

The problem of professional responsibility is as old as the accountancy profession itself, and will probably never be far from the thoughts of its members. Each of the writers represented in Chatfield acknowledged the difficulties associated with defining professional responsibilities, particularly when a profession is in its infancy. But, and this is evidenced by the amount of statutory control over accounting and auditing in the UK as compared with the US, there appears to have been a strange reluctance in the profession to regulate these matters internally. For example, it was not until the 1970s that a programme of accounting and auditing standards was initiated—despite an almost continuous commentary on these matters in the literature from 1880 onwards, and despite the existence of numerous court decisions and Companies Acts related to them.

This lack of authority on the part of the UK accountancy profession, coupled with an inevitable reliance on statutory control and court decisions, is hard to explain. Certainly, many writers appeared to be concerned to limit the responsibilities of accountants to factual matters. Anything to do with opinions and valuations was frowned upon. Thus, they may not have felt that such work required formal standardisation so long as they dealt only with 'facts'. The early importance of fraud and error detection in auditing is one example of this rather narrow approach to 'factual' work. Whitehill described it in 1897 in the following manner:[3]

> A certificate in its simplest form may be described as a written declaration of some fact or facts. Accountants' certificates are usually written declarations made upon accounts which accountants are called upon to examine into and verify. They are as important in relation to what they may be made to omit to disclose, as they are in relation to what they are made to purport to reveal. What, clearly, they are required to make known is truth; what to omit, falsity.

This rather 'black and white' view of accounting and auditing is typical of most of the earliest writings being reviewed. It does not, however, provide an explanation of why the members of the accountancy profession of that time were largely left to judge their responsibilities individually and personally. It may have been because these early practitioners were fiercely independent and wished to prove to the world at large that they could manage their own affairs in a competent manner. It may also have been because of a high regard for the rule of law although some, such as Dicksee, felt that the law in relation to accountancy matters was in need of considerable improvement.[4] On the other hand, it may simply have been because of the newness and fragmented nature of the profession—a co-ordinated voice thus not being available (such as that which now exists in bodies such as the Accounting Standards Committee and the Consultative Committee of Accountancy Bodies).

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[2] E. Crewdson, 'Codification of an Audit,' in Chatfield, *op cit*, pp. 143–4.

[3] R. Whitehill, 'Some Notes on the Responsibilities of Chartered Accountants With Regard to Their Certificates,' in Chatfield, *op cit*, p. 93.

[4] L. R. Dicksee, 'The Liabilities of Auditors Under the Companies Acts,' in Chatfield, *op cit*, pp. 106–17.

No firm or convincing explanation of the ill-defined nature of professional responsibility at the turn of the century can therefore be given. Because of a great deal of pressure for accounting and auditing change from non-accounting sources (for example, from various Chambers of Commerce), and despite obvious resistance to such change from professional accountants (and firms), UK accounting and auditing developments largely stemmed from company statutes.[5] Early accountants therefore appeared to be exceedingly reluctant to initiate change through their professional bodies, and it should not be surprising to witness the current muddle over inflation accounting in the UK—the early slowness to recognise the need for radical, long-term solutions despite external criticism to this effect; the stepping in by government in the form of the Sandilands Committee as a prelude to possible legislation; and the almost indecent haste of the professional bodies to produce a solution before such an event took place. In other words, as Hein demonstrates, there was an understandable reluctance in both the UK and US to be regulated by legislation, but an inexplicable unwillingness and inexperience in the UK to self-regulate.[6] In the US, self-regulation is a well-developed process in the accountancy profession.

Uncertainty in profit measurement

Brief is quite clear in his opinion that the major accounting problem from the 1880s to the present day has been the degree of uncertainty inherent in the measurement of profit—that is, the amount of subjective judgment with which reporting accountants and auditors have to cope:[7]

> The last two decades of the nineteenth century were a 'golden age' in accounting and most of the major issues connected with the subject of the accountant's responsibility were brought out in the period. Questions concerning full disclosure, alternative techniques, scope of audit and the meaning of the audit certificate were widely discussed in the first few years after the profession was formally established. However, nineteenth century accountants did not 'solve' most of the problems which they debated. One explanation for the perennial nature of controversy is the accountant's early attitude to uncertainty. During the last century, the profession began to emphasise the historical nature of accounting calculations even though many theorists recognised that forecasts and estimates were inherent in most problems.

From a review of the evidence in Chatfield and Hein, it is apparent that accounting practitioners were fully aware of what has come to be described as the issue of accounting standards. Despite the origins of the profession in legally-oriented matters such as bankruptcies, liquidations, executorships and arbitration, the accountants of the 1880s and 1890s were concerned with the difficulties of accounting practice—for example, in relation to stock valuations, depreciation of fixed assets, foreign exchange transactions, etc. The writings of practitioners such as Murray, Cooper, Pixley, Harvey and Dickinson testify to this.[8] However, a reading of each of these authors indicates that the emphasis was on the 'tidiness' of allocation procedures for matching purposes rather than in their relevance and suitability to the circumstances. Murray, for example, mainly discussed the relative merits of straight-line and reducing-balance methods of depreciation;[9] and Harvey made no definition of cost in relation to stock valuation whilst emphasising the need to ensure arithmetic correctness in the stock sheets.[10]

The general lack of emphasis in the late 1880s and early 1900s on the measurement of profit must have contributed to the profession's relative lack of attention to accounting standards. A reading of the evidence in Hein reveals that there was a generally accepted attitude in the accountancy profession and the business community against the disclosure of measured profits—an activity which was regarded as potentially harmful to business and, in any case, being the private concern of management.[11] The lack of compulsory auditing provisions in the Companies Acts from 1856 to 1900, and the emergence for the first time of compulsory profit reporting in the Companies Act 1929, further confirm the early efforts not to disclose profits. It is therefore not surprising that a formal accounting standards programme was not introduced in the UK until the early 1970s. Nor is it surprising that, to date, no Companies Act has contained specific provisions relating to measurement standards. Instead, the role of the Companies Acts has been to prescribe levels of accounting disclosure only.

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[5] See Hein, *op cit*, passim.

[6] Hein, *op cit*, pp. 11–86.

[7] R. P. Brief, 'The Accountant's Responsibility in Historical Perspective,' in Chatfield, *op cit*, p. 13.

[8] All in Chatfield, *op cit*.

[9] A. Murray, 'On the Progress of Accountancy and the Duties Which Come Within the Scope of an Accountant's Practice,' in Chatfield, *op cit*, p. 18.

[10] B. S. Harvey, 'The Limits Which a Chartered Accountant Should Place on His Duties and Responsibilities as an Auditor,' in Chatfield, *op cit*, p. 103.

[11] Hein, *op cit*, pp. 244–71.

The ability of accountants and managers to manipulate profits and balance sheet positions is at the basis of any contemporary accounting standards programme. It was also a problem not unknown to the early accounting practitioners. For example, Harvey had this to say of it:[12]

> As regards capital and revenue it is the duty of the auditor to discriminate between them. The natural tendency of companies will be to overcharge capital and reduce the charge to revenue; and, equally, the duties of the auditor will lie the other way, since a charge on revenue will mean a decrease of the profit available for dividend.

The role of the auditor to reduce profits for dividend purposes is perhaps a curious one, but reflects the inherent conservatism of accountants typified and formalised today by the prescription of accounting policies such as realisation and prudence.[13] In addition, it should be noted that Harvey's attention to profit measurement for dividend purposes is one of the most recurrent themes in the history of financial accounting. It is seen in most of the writings being reviewed, and is most evident in the considerable case law which was built up in the late 1880s and early 1900s—for example, in cases dealing with depreciation and distributable profits (such as *Lee v. Neuchatel Asphalte Co. Ltd.* (1889 41 Ch. 1); *Bolton v. Natal Land and Colonisation Co. Ltd.* (1892 2 Ch. 124); and *Wilmer v. McNamara & Co. Ltd.*, (1895 2 Ch. 245)). It is equally evident, however, in the most recent of financial accounting proposals. For example, the Sandilands Committee introduced current cost accounting in terms of a definition of profit related to distribution. Using and adapting the well-known Hicksian definition of 'well-offness', profit was defined by it as:[14]

> ... the maximum value which the company can distribute during the year, and still expect to be as well off at the end of the year as it was at the beginning.

Despite a warning that the current cost profit does not necessarily equate with the distributable profit, the emphasis of the adjustments in the recently published Exposure Draft 24 on current cost accounting is similarly inclined—for example, the computation of current cost profit after allowing for the current cost of sales, depreciation and working capital (each abated by a suitable gearing adjustment), and the recommended transfer to a capital maintenance reserve of all realised and unrealised holding gains (again abated where relevant).[15] The erosion of the operating capability of the business by over-distribution was stated to be a primary consideration in this respect.

Thus, little has changed in the major aims of financial accounting. The earliest writings reproduced in Chatfield, together with the research of Hein, reveal that the function at the turn of the century was orientated almost exclusively to proprietors (generally) and shareholders (particularly). This proprietary approach to accounting was further emphasised in the statutory control of companies and in the decisions of the courts. It should not therefore be surprising to see it appearing in many contemporary accounting proposals and practices. It is, however, of concern that such a narrow view of financial accounting and reporting has persisted so long, thus excluding the more neutral enterprise approach to the accounting entity concept, which allows for a wider, more liberal approach to accounting disclosures and the satisfaction of report user needs.[16]

Who are accountants?

The early years of any profession are obviously testing for it, if for no other reason than it has to establish its credibility (and that of its members). It is evident from a review of these early writings that accountants believed they were not highly regarded in the community, and were concerned to improve their image and their knowledge—for example, Murray advocated the attendance by practitioners at university law classes in order to improve their knowledge of the legal matters related to the work of the accountant;[17] Griffiths urged the need to ensure that the public was aware of what were the accountant's duties, as well as the requirement that accountants use clear, simple and understandable language in their financial reports;[18] an editorial in *The Accountant* outlined the problem of identifying who could properly be described as accountants;[19] Cooper described the first essential quality of an auditor as his independence;[20] Mather complained of the over-charging of fees for work done, and of the blatant touting for business which was taking place at the time;[21] and Crewdson suggested the codifying of audit practices in order to safeguard the client and provide a proper basis for the audit fee.[22]

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[12] Harvey, *op cit*, p. 103.

[13] See 'Disclosure of Accounting Policies,' *Statement of Standard Accounting Practice 2*, 1979.

[14] *Report of the Inflation Accounting Committee*, HMSO Cmmd. 6225, p. 29.

[15] 'Current Cost Accounting,' *Exposure Draft 24*, Accounting Standards Committee, 1979.

[16] See T. A. Lee, 'The Accounting Entity Concept, Accounting Standards, and Inflation Accounting,' *Accounting and Business Research*, forthcoming.

Most of these matters have a relevance today, as they relate to issues which have yet to be resolved, and which therefore remain under current consideration in the accountancy profession. The need for compulsory post-qualifying education is being considered in order to ensure a proper maintenance of technical standards amongst all practitioners; the need to produce accounting information in a comprehensible way is a major problem which is currently being researched;[23] the exclusion of unqualified persons from professional bodies does not prevent them describing themselves as 'accountants'; the question of independence is a long-standing one and is a major part of recent UK ethical statements;[24] advertising is under consideration and the subject of fees is a matter which causes accountancy firms great concern in relation to establishing proper systems (including adequate audit working papers) to ensure valid fee computations. In other words, there are many matters which currently concern the profession and which will continue to concern it and its members. The past is an adequate witness to that.

The state of the 'art' in 1903

What the previous sections have attempted to do is to reflect some of the main features and problems influencing accounting at the end of the nineteenth and beginning of the twentieth centuries—particularly as seen by practitioner writers of the times. The next section deals with a selection of writings (edited by Brief) which describe matters of importance in the accountancy profession in the first years of the twentieth century. Because they are commissioned writings on a variety of topics, however, they portray not only the practices and attitudes of the early 1900s but also pinpoint the problem areas then yet to be examined and resolved by practitioners over the next decades. As in the other collection of readings, the writers are, in the main, well known—for example, Richard Brown on 'Accountants' (reflecting the Scottish influence on world accountancy); Th. Limperg on accounting in Holland (Dutch accountants in 1900 apparently required a working knowledge of three languages other than Dutch!); Branford on the relationship of accounting to economics (particularly the theory of value so crucial to present-day debates on accounting measurements); Dicksee on 'Auditing' (and the relationship of accounting and auditing); Lisle on 'Balance Sheets'; Guthrie on 'Depreciation'; and Mann on 'Oncost' (reflecting again the influence of economics on accounting).

The writings in this volume of essays were largely ahead of their time. In them are seen the beginnings of issues of much concern to accountants today. They fall mainly into the area of accounting measurements based on arbitrary allocations. However, the then conventional view was expressed by Lisle in his description of a balance sheet:[25]

> A balance sheet is a concise statement compiled from the books of a concern which have been kept by double entry, showing on the one side all the assets and on the other side all the liabilities of the concern at a particular moment of time.

Lisle emphasised the concern of accountants at the time with accounting classification (that is, where to place data in financial statements rather than how to allocate or value it). This he did despite stating that assets should be described at their 'fair value'. He did not define the latter term

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[17] Murray, *op cit*, p. 21.

[18] J. G. Griffiths, 'Accountants and the Public,' in Chatfield, *op cit*, p. 28.

[19] '"Accountants" and Accountants,' in Chatfield, *op cit*, p. 24.

[20] E. Cooper, 'Chartered Accountants as Auditors of Companies,' in Chatfield, *op cit*, p. 33.

[21] J. Mather, 'The Ethics of Accountancy,' in Chatfield, *op cit*, p. 47.

[22] Crewdson, *op cit*, pp. 142–7.

[23] See, for example, T. A. Lee and D. P. Tweedie, *The Private Shareholder and the Corporate Report*, The Institute of Chartered Accountants in England and Wales, 1976.

[24] 'Ethical Guide for Members of the Institute of Chartered Accountants of Scotland', *Statements of Professional Conduct 1*, 1975, p. 5; and 1979, pp. 9–10.

[25] G. Lisle, 'Balance Sheets,' in Brief, *op cit*, p. 203.

(a situation to be evidenced consistently in the history of UK financial reporting, with the use of undefined phrases such as 'full and fair', 'true and correct' and 'true and fair' in disclosure legislation). A contrary and much more contemporary approach to accounting problems was evidenced in the work of Branford who regarded accounting as a system dealing with values:[26]

> The system of accounting is historically the means which experience has devised for comparing anticipated with actual valuations. Accounting from this broad point of view is to be regarded as that specialised form of activity to which the private individual, the man of business, the family group, or the state government all have recourse in the record and computation of values.

Profit, according to Branford, was the increase in the value of the proprietor's wealth. Values were identified as market prices (both buying and selling). The valuation approach to accounting, obviously rooted in economic theory, has only recently been recognised by accounting practitioners as being relevant to financial accounting practice (that is, as part of the resolution of the inflation accounting problem). It was therefore far ahead of its time in 1903.

The 'middle ground' between the classification approach of Lisle and the valuation approach of Branford is represented in the writings of several other contributors to the volume. For example, Dicksee, when identifying the need to relate accounting and auditing matters, was adamant in his view that balance sheets were not statements of fact (rather they were statements of opinion), and that the problem of cost allocation was crucial to the work of the auditor concerned with verifying the distributability of profits (a view which appears to be compatible with the present-day accounting standards programme).[27] Guthrie, too, expressed identical sentiments in relation to accounting for depreciation, regarding it as the crucial link between profit and capital.[28] He, like Dicksee, viewed the capital-revenue classification of expenditure as a most crucial matter in this respect.

Thus, by the early 1900s, the evidence from these writings shows growing attention being paid to cost allocations, although the major emphasis was more on cost classification and applying generally accepted allocation formulae than on the fundamental relevance of the information derived from such procedures. Mann, for example, went into great detail about the need to classify and document factory costs.[29] Much the same approach can be attributed to Mackenzie[30]—such writers evidencing the beginnings of contemporary cost and management accounting. An early attention to the topic of satisfying user needs is seen in a statement of Mackenzie (sadly not to be found elsewhere in writings specifically concerned with financial accounting):[31]

> The principal consideration in framing factory or workshop accounts is, what does the owner require to know?

One final matter of contemporary relevance in these writings relates to the vexed question of reserve accounting. This has always been a problem to accountants (particularly in relation to the practice of accounting for so-called secret reserves). It has become more of an explicit issue in recent times due to the introduction of current cost accounting in the UK, with its emphasis on maintaining operating capacity and thereby requiring elements of gain to be 'reserved' rather than treated as profit (as was the case formerly under the conventions of historic cost accounting).

Dawson contributed an article of 'Reserves and Reserve Funds'.[32] In it, he established the main question as the decision as to what is or is not a reserve. He preferred to treat all relevant gains or transfers as surpluses, and to identify as reserves those with assets set aside to cover them—in other words, a reserve only existed (in his view) if an equivalent asset could be identified. This is what he described as:[33]

> An asset held as a hostage for contingencies.

Such an approach reflects the conservatism of the accounting of the time, and goes well beyond the present approach to reserves (where assets are not identified in such a deliberate way). Nevertheless, in current cost accounting (as per Exposure Draft

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[26] V. V. Branford, 'Accounting in Its Relation to Economics,' in Brief, *op cit*, p. 27.

[27] L. R. Dicksee, 'Auditing,' in Brief, *op cit*, p. 167.

[28] E. Guthrie, 'Depreciation,' in Brief, *op cit*, pp. 357–8.

[29] J. Mann, 'Cost Records or Factory Accounting,' in Brief, *op cit*, pp. 260–99.

[30] C. Mackenzie, 'Factory Organisation and Costing Arrangements,' in Brief, *op. cit*, pp. 464–79.

[31] Ibid, p. 465.

[32] S. S. Dawson, 'Reserves and Reserve Funds,' in Brief, *op cit*, pp. 482–8.

[33] Ibid, p. 485.

24, for example), the transfer of 'realised' holding gains for stock (cost of sales), fixed assets (depreciation), and monetary working capital to a capital maintenance reserve would indirectly identify assets being held in the business for particular purposes other than for distribution to its owners. However, Dawson appears to have gone further, regarding reserve assets as being available only to meet contingencies:[34]

> A given concern may have a very large surplus of assets over its paid-up capital and liabilities, and yet have none of that surplus in such a form that it can be relied upon as a reserve asset to meet a contingency.

This almost suggests that reserves can only exist if there are equivalent assets in a realisable form. This is far from the modern approach to reserve accounting, but is entirely compatible with published balance sheets of the times which contained large amounts of liquid or near-liquid assets existing to 'cover' reserves.[35]

The problem of goodwill

The work of Yang in 1927 reflects well on the growing maturity of the accountancy profession in the 1880s and 1890s.[36] His topic was goodwill accounting, and much of what he writes about is just as relevant today as it was in the late 1920s. Goodwill constitutes what is arguably one of the least resolved of accounting issues, mainly because it relates to matters of considerable importance in accounting but over which there is little agreement as to how to account.

Yang emphasises these difficulties by isolating the main characteristics of goodwill and other intangibles—that is, their lack of substance; their unrealisability; and the difficulty of separating them from the more tangible features of a business enterprise. He also explains them in terms of their psychological attributes:[37]

> Goodwill is that aspect of our thinking which lends itself to a favourable judgement or choice toward a person or thing.

as well as their economic characteristics:[38]

> Goodwill represents the present worth or capitalised value of the estimated future earnings of an established enterprise in excess of the normal results that it might be reasonably assumed, would be realised by a similar undertaking established anew.

In this way, he strongly linked goodwill to prices and their profits, although he was exceedingly careful to point out the possible contributors to its existence—these including workers and management, consumers, location, and financial and credit agencies. The difficulties of isolating 'superior earnings' in order to capitalise the value of intangibles were also evident in this text, to such an extent that Yang condemned the procedure altogether:[39]

> Such a procedure would tend to destroy the essential purpose of accounting as a barometer of business efficiency.

Instead, he preferred to ignore the possibility of accounting for such 'created' goodwill and other intangibles, and to account for it in accordance with the conservatism which, by that time, was a well established part of accounting practice. Indeed, he advocated the use of a form of realisation:[40]

> The values of intangibles must come through the door of income. Until it is realised through income, an intangible value is usually but an unrealisable, indefinite, and incommensurable potentiality—an estimated earning power.

In a sense he continued this policy of prudence in his analysis and recognition of purchased goodwill—that is, he recommended it be accounted for by treating it as an asset to be written off over its estimated useful lifetime. How the latter was to be estimated was vague and unclear in the text and, as such, provided a clue as to why the problem of accounting for goodwill remains to this day. Nevertheless, the work of Yang is a good example of the advances that were being made in the 1920s in accounting thinking (if not in practice) as a result of the foundations laid down at the turn of the century.

Conclusions

All four texts covered in this review article reveal clearly a relative lack of progress in financial accounting thought and practice over the last one hundred years or so. Most of the problems identified by practitioners at the beginning of this period are still problems to the practitioners of today. Accounting is gradually maturing as a profession and a discipline. As such its theory and practice are evolving over the years. On the evidence briefly presented in this review, however, they are also revolving—as if on a spinning wheel. Perhaps this more than any other comment should be of most concern to today's accounting policymakers. For how many of these same problems will remain unresolved at the end of the next one hundred years? Finally, the books reviewed evidence the considerable impact on accounting matters of the leaders of the profession at the turn of century. They provided leadership in both thought and practice, and were obviously the academics of their day. It is therefore tempting to ask where this intellectual leadership is today amongst practitioners for, if it has disappeared, then the future development of accounting must be viewed with some concern.

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[34] Ibid, p. 486.

[35] See T. A. Lee, 'Company Financial Statements: An Essay in Business History 1830–1950,' in *Business and Businessmen*, S. Marriner, ed., Liverpool University Press, 1978, pp. 235–62.

[36] Yang, *op cit.*

[37] Ibid, p. 21.

[38] Ibid, p. 88.

[39] Ibid, p. 136.

[40] Ibid, p. 139.

Walter Taplin Prize

The Association of University Teachers of Accounting, the Council of Departments of Accounting Studies and *Accounting and Business Research* offer a prize of £75 for the best article published in each annual volume. The prize is named in honour of the journal's founding editor, Walter Taplin.

The winning article is chosen by the subscribers. Their choice in 1977/78 was Mark Tippett, *The Axioms of Accounting Measurement* (Autumn 1978).

Forthcoming Conferences

The next Conference of the Association of University Teachers of Accounting will be held at the University of Loughborough in April 1980. The next European Accounting Association conference will be held at the Free University of Amsterdam in March 1980.

The Third International Congress of Accounting Historians will be held at the London Business School on August 16, 17 and 18, 1980 during the centenary year of the Institute of Chartered Accountants in England and Wales. A special Accounting History issue of *Accounting and Business Research* will be published in 1980.

Accounting Applications of Covariance Analysis

Herbert L. Jensen and Steven D. Grossman

Regression analysis has been widely recommended in the past 15 years as an effective method for predicting and describing the behaviour of accounting costs. Its use in either managerial accounting or in auditing depends critically on generating a sufficient number of observations to insure stability in the regression coefficients and high explanatory powers for the regression equation. The objective of this paper is to introduce two tests that can be used to establish the validity of pooling observations from differing time periods or different cross-sectional elements and thereby also detect when fundamental differences exist between them.

Accounting uses of regression analysis

Regression analysis has been found especially useful for three prominent accounting tasks. It can specify the interrelationships that exist between financial items like sales, cost of goods sold, operating expenses, and accounts receivable. With it, financial information can be extrapolated to determine relationships that can be reasonably expected to hold in the future. In this manner judgements can be made about the adequacy of allowances for bad debts, premiums and price offers, guarantees, and purchase commitments for example. Lastly, regression analysis has wide application in assaying internal control systems in general [Gurry and Santi, 1975].

The statistical problems that arise in conjunction with regression analysis of accounting data have been well specified in most respects [Benston, 1966; Jensen, 1967]. One item that has not been adequately covered is the maximum number of observations that can be used to estimate a regression equation. It is quite clear that the minimum number of observations is one more than the number of independent variables. However, no such simple rule exists for determining when a series of observations constitutes two or more separate groups of data whose pooling violates 'the assumption that the past costs used for a regression analysis are a sample from a universe of possible costs generated by a continuing, stationary, normal process' [Benston, 1966, f.6].

This asserts that the number of observations that may properly be used as a homogeneous sample for estimating a regression equation may have a natural limit dictated by the human elements' attempts constantly to improve performance and productivity. At the extreme this implies that for some situations regression analysis cannot reasonably predict future relationships and can only be used to describe past performance. Both covariance analysis and Gujarati's dummy variable approach are adequate for detecting breaks in the homogeneity of data series [Johnston 1972; Gujarati, 1970a + b]. After describing these two tests, their use in both cross-sectional and intertemporal settings will be illustrated.

General covariance analyses

Covariance analysis considers data divided into p groups with n_k observations in the k^{th} group where $k = 1, 2, \ldots, p$. Any observation in the k^{th} group will consist of values for the dependent variable Y_k and for the m associated independent variables X_{ik} where $i = 1, 2, \ldots, m$. Here the data consist of dependent and associated independent variables which are classified by groups or treatments. Therefore, not only is the relationship of the dependent to the independent variables interesting, but also the effects of the groups on this relationship must be analysed.

The practical procedures for a general covariance test are based on comparisons between pairs of three sets of regressions. First, a regression is run for all the observations collectively. Next, regressions are run for the observations in each group. Last, a regression is run for all the observations collectively with a set of dummy variables added to the other variables. These dummy variables identify the groups to which each observation belongs. Symbolically, the following regressions are run:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_m X_m + \epsilon \quad (1)$$

$$Y_k = \alpha_k + \beta_{1k} X_{1k} + \beta_{2k} X_{2k} + \ldots + \beta_m X_{mk} + \epsilon_k \quad (2)$$

where there are $k = 1, 2, \ldots, p$ separate regression equations

$$Y = \alpha' + \alpha_1 D_1 + \alpha_2 D_2 + \ldots + \alpha_{p-1} D_{p-1} + \beta_1' X_1 + \beta_2' X_2 + \ldots + \beta'_m X_m + \epsilon' \quad (3)$$

where the D_k's assume a value of 1 if the observation is from the k^{th} group and zero otherwise.

The output from any standard computer software package for regression analysis will include the sum of squares, degrees of freedom, and mean square for the residual or error term. These can be plugged directly into the format given in Table 1 and used to conduct the F tests at the bottom of the table.

The first line of Table 1 needs some explanation. The sum of squares here is found by adding together the sum of squares for the error term in the individual regression runs for each group. The degree of freedom is similarly computed by adding together the degree of freedom for the error term in each separate regression run. The mean square error shown in line 1 of Table 1 may then be computed as shown. The mean square cannot be computed by adding together the mean squares for the error term in its individual group regression runs.

The F tests are conducted by comparing the F values shown on the bottom of Table 1 with the values for the F distribution found in any standard book of statistical tables. If a computed F value from Table 1 is less than the F value given in the statistical table for the desired level of significance with the same degrees of freedom, the null hypothesis of commonality is accepted. For F_1 then, a single intercept for all groups is accepted when the table value for F is higher. With F_2 a single slope can be accepted similarly and with F_3 both intercept and slope are jointly tested.

The Chow test

In many practical applications of the above technique there are often just two groups and the number of observations in one group is not greater than the number of independent variables plus one. In this special case the Chow test must be used to ascertain whether both groups may be considered to be from the same population [Chow, 1960; Fisher, 1970].

Table 1
Complete Analysis of Covariance Table

Source	*Sum of Squares*	*Degrees of Freedom*	*Mean Square*
Regressions for the individual groups	Residual $\Sigma \mathrm{SSR}_k = \mathrm{S}_4$	$\Sigma n_k - pm$	$\mathrm{MSR}_{\mathrm{S}_4} = \mathrm{S}_4/(\Sigma n_k - pm)$
	Incremental (Different slopes) $\mathrm{S}_3 = \mathrm{S}_2 - \mathrm{S}_4$	$pm - p - m + 1$	$\mathrm{MSR}_{\mathrm{S}_3} = \mathrm{S}_3/(pm - p - m + 1)$
Regression with dummy variables	Residual $\mathrm{SSR}_\mathrm{D} = \mathrm{S}_2$	$\Sigma n_k - p - m + 1$	$\mathrm{MSR}_{\mathrm{S}_2} = \mathrm{S}_2/(\Sigma n_k - p - m - 1)$
	Incremental (Different intercepts) $\mathrm{S}_1 = \mathrm{S}_2 - \mathrm{S}_0$	$p - 1$	$\mathrm{MSR}_{\mathrm{S}_1} = \mathrm{S}_1/(p - 1)$
Regression for all observations	Residual $\mathrm{SSR}_\mathrm{T} = \mathrm{S}_0$	$\Sigma n_k - m$	$\mathrm{MSR}_{\mathrm{S}_0} = \mathrm{S}_0/(\Sigma n_k - m)$

Test of different intercepts:

$F_1 = \mathrm{MSRS}_1/\mathrm{MSRS}_2$ with $p - 1, \Sigma n_k - p - m + 1$ degrees of freedom

Test of different slopes:

$F_2 = \mathrm{MSRS}_3/\mathrm{MSR}_{\mathrm{S}_4}$ with $pm - p - m + 1, \Sigma n_k - pm$ degrees of freedom

Tests of overall homogeneity

$$F_3 = \frac{\mathrm{S}_1 + \mathrm{S}_3/m(p-1)}{\mathrm{MSR}_{\mathrm{S}_4}} \text{ with } m(p-1), \Sigma N_k - pm \text{ degrees of freedom}$$

The Chow test is a gross measure of whether or not there is an overall difference between two regression equations. It does not specify whether the difference is because of the intercept term or because of the slope of the regression line. It is also limited to analysing only two subgroups of data at a time. When the number of independent variables is large relative to the number of observations, the Chow test is the only viable technique. This test has been described as follows [Grossman, 1973]:

(1) Obtain the sum of squared residuals for all the observations (SSR_T) and for each of the two subgroups (SSR_1 and SSR_2) for the estimated regression equations for these three groupings.
(2) Compute $SSR_S = SSR_1 + SSR_2$.
(3) Compute $SSR_{SD} = SSR_S/(N - 2k)$ where N is the total number of observations and k is the number of independent variables.
(4) Compute $SSR_I = SSR_T - SSR_S$.
(5) Compute $SSR_{ID} = SSR_I/k$.
(6) Test the F value SSR_{ID}/SSR_{SD} against the F value for the desired level of significance with k and $N - 2k$ degrees of freedom. If the computed F value is less than the F value given in the table, accept the null hypothesis that the two regressions are not different.

In most accounting applications of regression analysis the number of observations in each group will exceed the number of independent variables. Therefore the Chow test is not likely to be of use in practical circumstances and will not be discussed further here. The Chow test is mentioned only to make the theoretical discussion of this paper complete.

Gujarati's dummy variable approach

The dummy variable approach can ascertain whether regression equations differ in intercept or slope. Moreover, it will show which independent variable made the largest contribution to any difference in slope. It does require a large number of degrees of freedom in the initial specification of the regression equation because this technique effectively increases the number of independent variables geometrically by the number of subgroups. Severe problems with multicollinearity may also be encountered.

If the initial specification of the regression equation for all the observations combined was

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n$$

then for j subgroups of observations the Gujarati approach would specify the regression equation as

$$\begin{aligned} Y = \alpha_j &+ \alpha_1 D_1 + \alpha_2 D_2 + \ldots + \alpha_{j-1} D_{j-1} \\ &+ \beta_{1j} X_1 + \beta_{11} X_1 D_1 \\ &+ \beta_{12} X_1 D_2 + \ldots + \beta_{1j-1} X_1 D_{j-1} \\ &+ \beta_{2j} X_2 + \beta_{21} X_2 D_1 \\ &+ \beta_{22} X_2 D_2 + \ldots + \beta_{2j-1} X_2 D_{j-1} \\ &+ \ldots + \beta_{nj} X_n + \beta_{n1} X_n D_1 \\ &+ \beta_{n2} X_n D_2 + \ldots + \beta_{nj-1} X_n D_{j-1} \end{aligned}$$

where the $D_1, D_2, \ldots, D_{j-1}$ have a value of 1 if the observation comes from their subgroup and a value of 0 if the observation comes from some other subgroup. Note that when an observation comes from the j^{th} subgroup all the D's are zero while if an observation comes from other than the j^{th} subgroup, only one D is nonzero.

Using the additive and multiplicative properties of D, the values for the intercept and slope for each subgroup may be derived as follows:
1st subgroup:

$$\begin{aligned} Y_1 = (\alpha_j + \alpha_1) &+ (\beta_{1j} + \beta_{11}) X_1 \\ &+ (\beta_{2j} + \beta_{21}) X_2 \\ &+ \ldots + (\beta_{nj} + \beta_{n1}) X_n \end{aligned}$$

2nd subgroup:

$$\begin{aligned} Y_2 = (\alpha_j + \alpha_2) &+ (\beta_{1j} + \beta_{12}) X_1 \\ &+ (\beta_{2j} + \beta_{22}) X_2 \\ &+ \ldots + (\beta_{nj} + \beta_{n2}) Xn \end{aligned}$$

Penultimate subgroup:

$$\begin{aligned} X_{j-1} = (\alpha_j + \alpha_{j-1}) &+ (\beta_{1j} + \beta_{1j-1}) X_1 \\ &+ (\beta_{2j} + \beta_{2j-1}) X_2 \\ &+ \ldots + (\beta_{nj} + \beta_{nj-1}) X_n \end{aligned}$$

Last subgroup:

$$Y_j = \alpha_j + \beta_{1j} X_1 + \beta_{2j} X_2 + \ldots + \beta_{nj} X_n$$

Whether or not the regression equations for the subgroups differ, can be ascertained from the t values for $\alpha_1, \alpha_2, \ldots, \alpha_j$ and $\beta_{11}, \beta_{12}, \ldots, \beta_{1j}, \beta_{21}, \beta_{22}, \ldots, \beta_{2j}, \ldots, \beta_{n1}, \beta_{n2}, \ldots, \beta_{nj}$. If none of the t values for the differential intercept or slopes indicates statistical significance then the equation for Y_j above gives the common regression equation for the entire group of observations. If the t values of, say, β_{21} and β_{22} are significant then these coefficients differ between subgroups one and two.

Both the Chow test and Gujarati's dummy variable approach produce similar results. They are each equivalent to conducting an analysis of covariance for the group of observations [Feng-Yao, 1974]. All the techniques of covariance analysis are easier to understand through examples.

Cost volume relationships

Two different questions can be addressed in order to illustrate cross-sectional uses of covariance analysis. Can data from similar production processes be pooled? Can data on related cost elements be combined? Each situation is fairly common but all too frequently the answer to the question is an unthinking yes when such a reply may not be justified.

Consider the case where there are three production lines which come on stream successively as production demands increase and which vary slightly in the machinery and personnel used on them. Visual fitting of a regression line to the scatterplots of the data results in the graphs shown in Figure 1 [Bierman and Dyckman 1976, p. 542]. Assuming that the underlying data for these three diagrams are those given in Table 2, both general covariance analysis and Gujarati's dummy variable approach can be used to determine if there are indeed three distinct production processes here. The Gujarati dummy variable approach is concerned with the t statistics for the coefficients of $C = \alpha_3 + \alpha_1 D_1 + \alpha_2 D_2 + \beta_3 \phi + \beta_1 \phi D_1 + \beta_2 \phi D_2$ where C is cost, ϕ is output, D_1 has a value of one if the observations came from line one and zero otherwise, D_2 has a value of one if the observation came from line two and zero otherwise. When this regression is run using the data of Table 2, none of the t statistics for the coefficients of the differential variables is significantly different from zero at any reasonable level of confidence. However, in view of the clear fitting of three different equations to this data by a reputable authority, as shown in Figure 1, a general covariance analysis can also be conducted to see if these graphs do indeed 'illustrate three different cost-volume relationship[s]' [Bierman and Dyckman, 1976, p. 542].

The results from running the regressions necessary for covariance analysis are shown in Table 3. When these results are plugged into the format of Table 1, Table 4 emerges. The F tests conducted at the bottom of Table 4 confirm the results of the Gujarati dummy variable approach. The cost volume data presented in Table 2 were drawn from one population, not three. A single regression equation for all three lines properly describes the data. Separate regression equations for each production line distort the true cost-volume relationship.

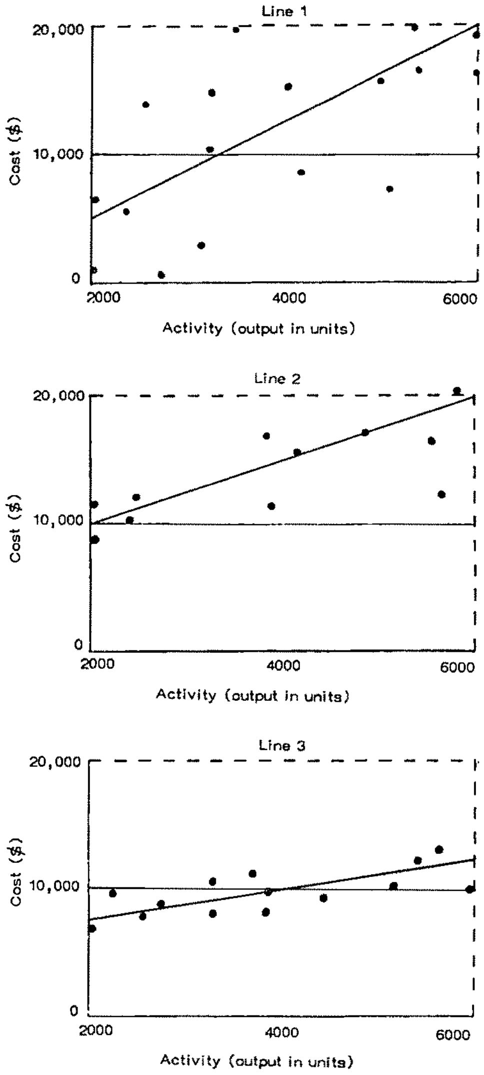

Figure 1
Scatterplots for Production Line 1–3 Time Periods 1–17

Expense control

Consider now the case of a single production process using both electricity and natural gas. Given the data for a year's expenses as shown in Table 5 [Matz and Usry, 1976, pp. 553 & 554] it is quite proper to question whether analysis of total utility costs rather than analysis of its elements is justified. Secondly it would be valuable to know if the bookkeeping effort involved in maintaining

Table 2
Cost and Output Data Production Lines 1–3 Time Periods 1–17

	Line 1		Line 2		Line 3	
Time Period	*Cost*	*Units of Output*	*Cost*	*Units of Output*	*Cost*	*Units of Output*
1	$1000	2000				
2	6000	2000				
3	5000	2400				
4	14,000	2550	$7000	2000		
5	500	2800	9950	2400		
6	3500	3100	8900	2600		
7	10,100	3150	9150	2800		
8	15,000	3200	8000	3400	$8700	2000
9	19,900	3500	10,400	3400	11,000	2000
10	15,500	4000	11,000	3700	10,500	2450
11	8900	4200	8000	3900	12,500	2500
12	16,000	5100	10,000	3900	11,000	4900
13	8000	5200	9800	4300	18,000	4900
14	20,000	5500	10,200	5200	16,800	4000
15	17,000	5550	12,500	5500	17,500	4500
16	16,500	6000	13,500	5700	17,000	5700
17	19,500	6000	10,000	6000	20,900	5800

Table 3
Regressions for Covariance Analysis of Table 2's Data

				Error Term		
Data	*Fitted Equations*	R_2	*F*	*Sum of Squares*	*DF*	*Mean Square*
All Lines	$C = 2979 + 2.23\phi$	0.36	22.03	648,366,356	39	16,624,778
Line 1	$C_1 = -864 + 3.19\phi_1$	0.46	12.57	383,793,882	15	25,586,259
Line 2	$C_2 = 6359 + 0.90\phi_2$	0.45	9.84	21,154,264	12	1,762,855
Line 3	$C_3 = 5895 + 2.19\phi_3$	0.65	14.79	53,266,613	8	6,658,327
All with Dummy Intercept	$C = 5689 + 288D_2 - 4593D_3 + 2.25\phi$	0.48	11.50	524,921,034	37	14,187,054

Table 4
Analysis of Covariance for the Production Lines

Source	*Sum of Squares*	*DF*	*Mean Square*
S_4	Residual: 458,214,759	35	13,091,850
S_3	Incremental Slope: 66,706,275	2	33,353,138
S_2	Residual: 524,921,034	37	14,187,054
S_1	Incremental Intercept: 123,445,322	2	61,722,661
S_0	Residual: 648,366,356	39	16,624,778

Coefficients	*F Tests*	*DF*	*5% Point Table Value*	*Decision on Commonality*
Intercept	$F_1 = \frac{61{,}722{,}661}{14{,}187{,}054} = 4.3506$	2,37	19.47	Accept
Slope	$F_2 = \frac{33{,}353{,}138}{13{,}091{,}850} = 2.5476$	2,35	19.47	Accept
Overall	$F_3 = \frac{190{,}151{,}579/4}{13{,}091{,}850} = 3.6311$	4,35	5.72	Accept

Table 5

Monthly Expense Data January to December

Month	*Direct Labour Hours*	*Electricity Expense*	*Natural Gas Expense*	*Total Utility Expense*
Jan.	34000	$640	$660	$1300
Feb.	30000	620	590	1210
Mar.	34000	620	660	1280
Apr.	39000	590	680	1270
May	42000	500	740	1240
June	32000	530	610	1140
July	26000	500	580	1080
Aug.	26000	500	550	1050
Sept.	31000	530	630	1160
Oct.	35000	550	640	1190
Nov.	43000	580	750	1330
Dec.	48000	680	770	1450
Totals	420,000	$6,840	$7,860	$14,700

separate accounts for electricity and natural gas produces more useful information than the maintenance of a single utility account would.

The fact that the coefficient of determination between direct labour hours and electricity expense is $R^2 = 0.24667$ and the coefficient of determination between direct labour hours and natural gas expense is $R = 0.94990$ answers neither question because the two are probably close substitutes as factors of production here so that total utility may give a better explanation of the salient relationship.

Table 7

Historical Data on Direct Labour Hours and Costs January 1976–December 1977

Time Period 1976	*Direct Labour Hours*	*Cumulative Change In Hourly Wage Rate*	*Direct Labour Costs*
Jan.	7700	$0.00	$12,420
Feb.	9100	0.00	14,760
Mar.	8700	0.00	13,720
Apr.	6900	0.00	10,740
May	10,200	0.00	16,320
June	11,000	0.05	18,150
July	9400	0.05	15,610
Aug.	10,600	0.05	17,390
Sept.	8000	0.05	13,400
Oct.	12,200	0.10	21,040
Nov.	6200	0.10	10,140
Dec.	11,900	0.10	20,230
Time Period 1977			
Jan.	12,600	0.10	21,720
Feb.	9600	0.20	17,180
Mar.	10,400	0.20	18,520
Apr.	7200	0.20	13,060
May	8800	0.30	16,820
June	6600	0.30	12,740
July	11,700	0.30	22,330
Aug.	10,200	0.30	19,180
Sept.	7300	0.40	14,300
Oct.	12,800	0.40	25,800
Nov.	11,000	0.40	22,000
Dec.	8400	0.40	16,600

Table 6

Analysis of Covariance for the Gas and Electric Expense

Source	*Sum of Squares*		*DF*	*Mean Square*
S_4	Residual:	33,436	20	1,672
S_3	Incremental Slope	7,932	1	7,932
S_2	Residual:	41,368	21	1,970
S_1	Incremental Intercept	43,350	1	43,350
S_0	Residual:	84,718	22	3,855

Coefficients	*F Tests*	*DF*	*5% Point Table Value*	*Decision Commonality*
Intercept	$F_1 = \frac{43{,}350}{1{,}970} = 22.0050$	1,21	248.00	Accept
Slope	$F_2 = \frac{7{,}932}{1{,}672} = 4.7440$	1,20	248.00	Accept
Overall	$F_3 = \frac{(43{,}350 + 7{,}932)/(1 + 1)}{1{,}692} = 15.1543$	2,20	19.44	Accept

When the necessary regressions have been run on the data for gas and electric expense Table 6 can be constructed. The F tests indicate that the gas expense and the electric expense vary in the same way with direct labour hours. An immediate inference is that prediction of total utility expense will be more reliable than the dual prediction of gas and electric expense separately. This follows from the fact that most of the systematic variation of utility expense with direct labour hours will be eliminated by combining the gas and electric expense elements into a single account. Such combining is only justified however when the expenses can be shown to be similar as was done here through covariance analysis. The fitted regression line for the total utility expense (U) and direct labour hours (H) of Table 5 is $U = -31{,}030 + 53.9H$ with an $R^2 = 0.7780$. What the covariance analysis has shown is that given the current technology of the firm's production processes and the relative factor prices for gas and electricity, these two forms of power are nearly perfect substitutes. Therefore the information content of separate accounts for gas and electric expense is very low relative to a single utility expense account.

Flexible budgeting

The use of either general covariance analysis or the Gujarati dummy variable with time series data can answer the question of whether the data from successive time periods can be justifiably united. The usual assumption is that the underlying productive processes are altered or modified over time but at a rate slow enough that two or three years' historical data are sufficiently similar for prediction over the coming few years. This may not be so and should be verified in any case. The example to be given here is the development of a flexible budget.

The major problem in developing a flexible budget is, of course, specifying how it should flex. Determination of the operative interrelationships is normally done through a multiple regression analysis of a historical series of data covering a reasonable range of production levels. The number of observations available is dependent on the natural divisions in the bookkeeping process. As time periods get shorter, the probability of a misallocation of cost to a time period gets greater increasing the problem of measurement errors in the data. On the other hand, the longer the time period used for collecting data, the fewer will be the available observations. The net result is that monthly data are most commonly used for accounting cost estimation and two or three years of data are used in order to have sufficient observations.

For example, 2 years of monthly data on direct labour hours, hourly wage increases, and direct labour costs might be used to develop a range of direct labour costs for a flexible budget. Using the data from Table 7 [Troxel, 1965], specification of the relationship among those three variables might be desired. While that is being done, however, it is also necessary to determine that the years 1976 and 1977 do not represent two different periods in the firm's history. With a general analysis of covariance, the null hypothesis

Table 8

Gujarati Dummy Variable Approach for Table 7

```
Dependent Variable: C
Source                            DF       Sum of Squares          Mean Square
Model                              5    365880925.53417044    73176185.10683408
Error                             18      1467170.29916352       81509.46106464
Corrected Total                   23    367348095.83333396
                 F Value         PR > F        R-Square                C.V.
                 897.76          0.0001        0.996006              1.6953
                                STD DEV                              C Mean
                              285.49861832                        16840.41666667

                                T for H0:                        STD Error of
Parameter        Estimate     Parameter = 0     PR > |T|           Estimate
Intercept    -1205.81016211       -2.79          0.0120          431.53769706
H                1.73710289       36.16          0.0001            0.04803690
HD7              0.18587170        2.93          0.0089            0.06338918
W             8015.81736273        3.63          0.0019         2210.40093974
WD7           2038.20013824        0.86          0.4023         2376.35642854
D7           -2057.34802269       -3.08          0.0065          668.99470448
```

Table 9
Final Equation for the Data in Table 7

Dependent Variable: C

Source	DF	Sum of Squares	Mean Square
Model	4	365820963.20234614	91455240.80058653
Error	19	1527132.63098782	80375.40163094
Corrected Total	23	367348095.83333396	

F Value	PR > F	R-Square	C.V.
1137.85	0.0001	0.995843	1.6835

STD DEV	C Mean
283.50555838	16840.41666667

Parameter	*Estimate*	*T for H0: Parameter = 0*	PR > |T|	*STD Error of Estimate*
Intercept	−1150.63479869	−2.72	0.0137	423.73705665
H	1.72330633	38.34	0.0001	0.04494768
HD7	0.19786783	3.22	0.0045	0.06139531
W	9779.27803282	12.14	0.0001	805.87138865
D7	−2014.89689452	−3.04	0.0067	662.50389215

that they are the same period may be supported or not supported. With the Gujarati dummy variable approach whatever differences there may have been can be detected using the regression equation

$$C = \alpha_6 + \alpha_7 D_7 + \beta_H H + \beta_{H7} HD_7 + \beta_w W + \beta_{w7} WD_7$$

where C is direct labour costs, H is direct labour hours, W is the cumulative change in the hourly wage rate since January 1976, and D_7 is 1 if the data are from 1977 and is zero otherwise.

The results of this regression are shown in Table 8. The t test indicates that the regression coefficient for WD_7 is not significantly different from zero but that all the other coefficients are. This implies that the years 1976 and 1977 are best represented by two separate regressions. These can be read from Table 9 where the equation

$$C = \alpha + \alpha_7 D_7 + \beta_H H + \beta_{H7} HD_7 + \beta_w W$$

has been estimated. The equation for 1976 is then

$$C_6 = \alpha + \beta_H H + \beta_w W = -1150.63 + 1.72H + 9779.28W$$

while the equation for 1977 is

$$\begin{aligned} C_7 &= (\alpha + \alpha_7) + (\beta_H + \beta_{H7})H + \beta_w W \\ &= -(1150.63 + 2014.90) + (1.72 + 0.20)H + 9779.28W \\ &= -3165.53 + 1.92H + 9779.28W \end{aligned}$$

Therefore extrapolative prediction techniques based on the years 1976 and 1977 are not justified. Both the fixed element of direct labour costs and the mix of wage rates for the direct labour workforce are shifting over time. Before any flexible budget can be constructed it is necessary to estimate the rates of change for these parameters thereby explicitly considering them in the managerial planning process.

Summary

Regression analysis has found wide use in managerial accounting. It implicitly relies on a steady state assumption about the data generating process, however, and violations of that assumption will invalidate regression results. Inasmuch as a firm's managers should be constantly striving for improved performance, any assumption that a large number of observations on cost accounting numbers forms a homogeneous data base should be questioned. A general analysis of covariance and Gujarati's dummy variable approach offer two means of determining when cost accounting data from different cross sections of operations or from different time periods may be grouped together for regression analysis.

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Divisional Performance Measurement: Beyond an Exclusive Profit Test

Lee D. Parker

The measurement of divisional performance in decentralised companies has come to be generally practised by means of a single index of divisional profitability. Accountants have traditionally been placed in the position of designing or adopting a measure of division performance which best 'represents top management objectives'.[1] This has been seen to be best represented by some form of divisional profit index in accordance with accountants' concentration upon the profit goal of the firm.[2] Divisional performance measurement literature has therefore concentrated upon the development and use of a single index of divisional success couched in terms of profit. Alternative indices of divisional profit which have become generally accepted include:

1. Division Net Profit
2. Division Controllable Profit
3. Division Contribution Margin
4. Return on Investment
5. Residual Income[3]

This approach to divisional performance measurement is based to a large degree upon accountants' acceptance of the concept of goal congruence which for instance Horngren[4] defines as achieved when a corporate accounting system specifies goals and subgoals to encourage behaviour such that individuals accept top management goals as their personal goals. This paper extends the argument against the validity of this goal congruence concept to argue that the current accounting approach to divisional performance measurement is biased, narrow and unrealistic in view of the range of objectives towards which any one division strives. This argument is further extended to consider the single divisional profit index as an instrument of top management control and the conflicts with divisional autonomy which that may involve. The alternative presented by this paper therefore is a return to the development of multiple measures of divisional success criteria of a quantitative and qualitative type.

Goal congruence questioned

The arguments against the efficacy of the goal congruence concept can be summarised as follows.[5] Accountants' belief in their responsibility for encouraging goal congruence among managers has its origins in part in their unitary view of the business enterprise. On the other hand many organisation theorists hold a pluralist view of the business enterprise[6] in that it is comprised of a coalition of individuals and groups who cooperate to go some distance towards achieving their separate objectives. It can therefore be argued that a company is a coalition of which top management is only one part, where a whole range of aspirations are continually juggled and balanced.

The difference between the unitary and coalition views of the firm is largely attributable to the progression of concepts of the firm developed from the classical economic and management schools around 1900 to 1939 to the more behavioural perspective of the modern organisation theorists around 1940 to 1970. The classical unitary view emanated from the works of such writers as Max Weber[7] and Frederick Taylor,[8] while the behavioural perspective can be assembled from the works of a considerable body of researchers such as Mayo, Merton, Selznick, Maslow, Gouldner, Simon and March, McGregor, Argyris, and Tannenbaum.[9] The classical economic/management theories of the firm are built upon the principles of division of labour, chain of command, line and staff structure and span of control.[10] The firm is viewed as an entrepreneur who seeks to maximise the firm's profit by rationally deciding upon courses of action with full knowledge of available alternatives.[11] This classical perspective is limited, however, by its concentration upon the formal structure of organisation and by its neglect of individual personality, informal groups, intrafirm conflicts and decision processes.[12] The modern organisation theory approach, however, focusing primarily on human organisation and relying more upon empirical research data, investigates strategic parts of the organisation's subsystems, their interrelatedness, and their goals.[13] The frame of reference adopted is described as behavioural and it argues that:

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[1] C. T. Horngren, *Cost Accounting: A Managerial Emphasis*, Prentice-Hall, 4th Edition, 1977, p. 709.

[2] G. Shillinglaw, *Managerial Cost Accounting*, Richard D. Irwin, 4th Edition, 1977, p. 777.

[3] C. L. Moore and R. K. Jaedicke, *Managerial Accounting*, South Western Publishing Company, 4th Edition, 1976, pp. 517–520.

[4] C. T. Horngren, *op. cit.*, p. 151.

[5] For a fuller discussion of this view refer to L. D. Parker, 'Goal Congruence: A Misguided Accounting Concept', *Abacus*, June 1976, pp. 3–13.

[6] Refer to A. Fox 'Industrial Relations: A Social Critique of Pluralist Ideology' in *Man and Organization*, J. Child (ed.), George Allen and Unwin, London, 1973, pp. 185–199.

[7] Refer for instance to M. Weber, 'Legitimate Authority and Bureaucracy', reprinted in *Organization Theory*, D. S. Pugh (ed.), Penguin 1971, pp. 15–29.

[8] F. W. Taylor, *The Principles of Scientific Management*, New York, 1913.

1. The firm of itself does not act. Only its personnel act.
2. Behaviour is conditioned by personality as well as environmental factors.
3. Behavioural processes of organisation members are a function of their cognitions, perceptions, beliefs and knowledge.
4. Rewards or goals are often complex.[14]

In seeking to promote goal congruence (rather than a looser form of coordination for instance) through divisional performance measurement, accountants are adhering to a predominantly classical view of organisations. (This will be demonstrated further in this paper with reference to the accounting literature on divisional performance measurement.) Their perspective of divisional performance measurement would be more amenable to modification if they incorporated more of the modern organisation theory views into their thinking. In this way, the divisionalised firm could be considered in terms of the goals, motivations and decisions of its participants who form a bargaining, equilibrium-seeking, decision-making system.[15]

Organisation and administrative theorists have further recognised that a single dominant enterprise goal is unlikely to be discovered and have argued for the simultaneous existence of a whole range of corporate goals some of which may even conflict.[16] It is arguable, for instance, whether an organisation can be conceived as having 'a goal'. An individual can be approached to determine his goals, but an organisation cannot be approached in the same way.[17] Instead, the 'coalition' view of the organisation allows the recognition of organisational goals which reflect the demands of an often conflicting coalition. Thus Schiff and Lewin[18] point out that these goals need not be internally consistent with each other, that they may vary in terms of prescription of action and measures of success and that they are the outcome of bargaining processes. This state of affairs reflects the fact that individuals provide the organisation with goals and skills.[19] The composition of an organisation's 'goal set' at any point of time will then reflect the bargaining power and position of its subcoalitions and the extent of consensus reached.[20] Empirical evidence for the existence of an organisational 'goal set' and some determinants of its components has been available as far back as 1959.[21]

The economic model of profit maximisation which is usually utilised in accountants' treatment of goal congruence as the predominant goal of the firm has also been questioned from time to time.[22] Its assumption of the rational decision-maker is at odds with the perspectives adopted by psychologists, sociologists and anthropologists and its assumption of certainty about future outcomes has been criticised as being unrealistic. The observed tendency of individuals to adopt satisficing behaviour[23] provides further doubt as to the ability of companies to act as true profit maximisers. Huff and McGuire[24] point out that empirical studies as far back as 1939 have indicated that businessmen do not even know how to begin, in the uncertain real world, to maximise profits. Indeed goals have even been likened to rationalisations of prior actions[25] which raises the question as to whether a goal is a means to an end rather than an end in itself.

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[9] Refer for instance to E. Mayo, *The Social Problems of an Industrial Civilisation*, Harvard, Boston 1945; R. K. Merton, 'Bureaucratic Structure and Personality', in *A Sociological Reader on Complex Organisations*, A. Etzioni (ed.), Holt Rinehart and Winston, 1970, pp. 47–59; P. Selznick, 'Foundations of the Theory of Organisations', reprinted in *Systems Thinking*, F. E. Emery (ed.), Penguin Modern Management Readings, 1969, pp. 261–267; A. H. Maslow, *Motivation and Personality*, Harper, New York, 1954; A. W. Gouldner, *Patterns of Industrial Bureaucracy*, Free Press, Glencoe, Illinois, 1954; J. G. March and H. A. Simon, *Organizations*, Wiley, New York, 1958; D. McGregor, *The Human Side of Enterprise*, McGraw-Hill, New York, 1960; C. Argyris, *Integrating the Individual and the Organisation*, Wiley, New York, 1964; and A. S. Tannenbaum, *Social Psychology of the Work Organisation*, Tavistock, London, 1966.

[10] W. G. Scott, 'Organization Theory: An Overview and an Appraisal', in *Organizations: Structure and Behavior*, Vol. 1, 2nd Edn, J. A. Litterer (ed.), Wiley, New York, pp. 16–17.

[11] J. W. McGuire, *Theories of Business Behavior*, Prentice-Hall, Englewood Cliffs, NJ, 1964, pp. 19–20.

[12] W. G. Scott, *op. cit.*, pp. 16–17.

[13] *Ibid.*, pp. 21–25.

[14] J. W. McGuire, op. cit., pp. 27–28.

[15] M. Schiff and A. Y. Lewin, *Behavioral Aspects of Accounting*, Prentice-Hall, Englewood Cliffs, NJ, 1974, pp. 4–5.

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[17] D. Silverman, *The Theory of Organisations: A Sociological Framework*, Heinemann, London, 1970, p. 9.

[18] M. Schiff and A. Y. Lewin, *op. cit.*, pp. 5–7.

[19] R. D. Lansbury and P. Gilmour, *Organisations: An Australian Perspective*, Longman Cheshire, Melbourne, 1977, p. 83.

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[21] Refer to a study conducted by J. K. Dent, 'Organizational Correlates of the Goals of Business Management', *Personnel Psychology*, 1959, pp. 365–393.

An alternative view of corporate functioning therefore emerges. The company may be viewed as a coalition in which participants continually bargain for the composition of a set of corporate goals which continually change in response to the bargaining process and in response to personnel entering and leaving the company. That is to say, accountants must recognise that goal setting is essentially a human-political process. Top management's long term goals may not be shared by division managers. Goals are formulated by individual personnel, groups, departments, divisions etc., so that corporate goals may be at least in part formulated in response to pressures from all levels of the organisational hierarchy. This observation leads Leavitt *et al*[26] to argue that organisational goals are set to a large extent through internal negotiation among organisational subunits. Corporate goals therefore become a set of short term stabilisers for expectations derived from a whole range of individual and group activities.[27] Should accountants come to recognise the 'goal set' as a realistic view of corporate goal structure, then they are still faced with the task of defining whether it includes policies, strategies, goals, forecasts and tactics. Even so, the 'goal set' has been implicitly recognised by many management writers in their descriptions of corporate objectives such as market standing, productivity, profitability, staff development, labour relations, public image, social responsibility, technical leadership etc.

Goal congruence as a concept for application in both centralised and divisionalised companies appears to be of doubtful relevance. Modern organisation theory would appear to suggest that accountants' encouragement of congruence between divisional and corporate goals is both unnecessary and misdirected. This view would furthermore argue that only loosely coordinated divisional operations may be quite tolerable and indeed the best that can be hoped for in many decentralised organisations. Even when some operations are coordinated, the goals of different divisional groups may be far from reconciled or congruent. Instead, a divisionalised company is likely to accommodate a whole range of (sometimes inconsistent) goals, generated by a variety of individuals and groups, continually being modified, and being reviewed in terms of satisfactory rather than maximum performance. Nevertheless accountants continue to pursue goal congruence in their construction of divisional performance measures. It is to the effects of this approach upon divisional performance measurement that this paper now turns.

Goals in traditional divisional performance measurement

Classical management assumptions about corporate goals have been seriously questioned and yet traditional accounting thought has continued to subscribe to those assumptions. These appear to be largely unrealistic and yet they are still in evidence in accounting texts dealing with divisional performance measurements. Even so, accounting writers sometimes unwittingly make contradicting statements or indeed deliberately point out contradictions which have become evident to them. Horngren for instance makes two potentially contradictory claims on one page,

> Keep in mind that an organization is a group

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[22] Refer to J. W. McGuire, 'The Finalité of Business', in *Management and the Behavioral Sciences*, M. S. Wadia (ed.), Allyn and Bacon, Boston, 1968, p. 383 and M. F. Cantley, 'The Choice of Corporate Objectives', *Long Range Planning*, September 1970, pp. 36–42.

[23] C. Perrow, *op. cit.*, p. 149.

[24] D. L. Huff and J. W. McGuire, 'The Interdisciplinary Approach to the Study of Business', reprinted in *Management and Organizational Behavior Theories: An Interdisciplinary Approach*, W. T. Greenwood (ed.), South Western Publishing Co., Cincinnatti, Ohio, 1965, pp. 94–95. They cite the empirical studies of R. L. Hall and C. J. Hitch, 'Price Theory and Business Behavior', *Oxford Economic Papers*, May 1939 and R. A. Lester, 'Shortcomings of Marginal Analysis for Wage-Employment Problems', *American Economic Review*, March, 1946.

[25] K. E. Weick, *The Social Psychology of Organizing*. Addison-Wesley, Reading, Mass, 1969, pp. 8, 37–38.

[26] H. J. Leavitt, W. R. Dill, H. B. Eyring, *The Organizational World*, Harcourt Brace Jovanovich, New York, 1973, pp. 23–25.

[27] Refer to C. Perrow, *op. cit.*, p. 162 and R. M. Cyert and J. G. March, *A Behavioral Theory of the Firm*, Prentice-Hall, Englewood Cliffs, NJ, 1963, pp. 4–43, 83–127.

> of individuals seeking to achieve some common goals....
>
> Each member has objectives of his own, often not coinciding with those of the organization.[28]

The first statement merely expresses the classical management assumption while the second statement implies a coalition view of the company which appears to refute the assumption in the first statement. Solomons'[29] view of divisional and corporate goal-setting is similarly classical. He defines success in divisional performance merely as success in earning a profit and appears to base his complete examination of divisional performance upon this one premise.

Amey[30] has also taken a relatively classical view of the corporate objectives in his treatment of divisional performance. While considering profitability to be the key indicator of business success he does recognise the possibility of multiple objectives but still sees them only in the context of economic success and economic efficiency. Indeed quite early in his study, he recognises the possibility of multiple corporate objectives other than profit and rate of return but chooses to ignore them in his economic efficiency calculations.

On the one hand Amey[31] advances convincing arguments for the probability that profit satisficing is an aim of companies rather than profit maximising, since it reduces the risk of close substitutes appearing, reduces the risk of large established companies entering the industry and reduces the risk of governmental anti-monopoly legislation. On the other hand he suggests that whatever the company's overall objective is (and most organisation researchers would claim that there is more than just one), the first two elements for economic efficiency should be retained—maximum physical productivity and minimum unit cost. Presumably Amey has recognised the possible existence of the 'goal set' but has then chosen to ignore it. For the purposes of fairly assessing divisional performance, it is difficult to see how it can be ignored. Furthermore given the unlikely existence of the single, profit-maximising corporate and divisional goal, and given the suggested weaknesses in the concept of goal congruence, these observations might cause accountants to wonder whether the continued attempts to refine divisional profit measures are really likely to be useful or relevant to the needs of the modern corporation.

The manager or the measure

Horngren identifies one of the causes of dysfunctional decision making in decentralised companies as being:

> a lack of harmony or congruence between the overall organizational goals and the individual goals of the decision makers.[32]

The accountant's task of persuading (by measurements or any other means) managers to give up some of their personal objectives in favour of some officially pronounced top management goals may be quite difficult and misdirected in any case. ROI, for instance, may induce certain behavioural responses in managers but are hardly likely to cause them to alter their desires, needs and philosophies. Top management goals, furthermore, may bear little resemblance to the real company goal set generated from all levels of management, unions, interest groups and individual employees.

The prime importance of divisional managers' own objectives is recognised by Moore and Jaedicke[33] when they support Dean's argument that the selfish interests of division managers can be aligned more closely with company (top management) goals by allowing transfer prices to be determined by negotiation and by allowing divisional managers recourse to markets outside the company. Whether negotiation could fulfil such an aim is debatable. Nevertheless the argument does recognise the direct effects on company operations which divisional managers' objectives can have. What the argument above also demonstrates about traditional management accounting thinking is its preoccupation with refining measures for directing employee behaviour to suit top management ends. This is even more amply demonstrated by Tomkins' statement that:

> When examining operating decisions, it was generally assumed that delegation of the deci-

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[28] C. T. Horngren, *Cost Accounting: A Managerial Emphasis*, Prentice-Hall, 1972, 3rd edition, p. 697.

[29] D. Solomons, *Divisional Performance: Measurement and Control*, Irwin, Homewood, Illinois, 1965, pp. 60, 238.

[30] L. R. Amey, *The Efficiency of Business Enterprise*, George Allen and Unwin, 1969, pp. 3–4, 15.

[31] *Ibid.*, pp. 152–154.

[32] C. T. Horngren, 3rd edition, *op. cit.*, p. 694.

[33] C. L. Moore and R. K. Jaedicke, *Managerial Accounting*, South Western Publishing, 1972, p. 556, supporting J. Dean, 'Decentralization and Intracompany Pricing, *Harvard Business Review*, 1955.

> sion-making process to divisions was desirable provided that a suitable technical procedure was available for simultaneously achieving maximization of both corporate objectives and divisional objectives.[34]

Given the fickle nature of human behaviour and the range of ever changing corporate goals, that ultimately suitable technical procedure may in fact never be found. Tomkins[35] does concede the possibility of deliberate self-interest in division managers. The remedy, he suggests, lies in a 'good performance evaluation and reward procedure'. Given the questionable validity of the goal congruence concept, that procedure may be too narrowly based and largely misdirected. Furthermore, such an obvious 'carrot and stick' philosophy may cause division managers to ignore top management goals to an even greater extent.

It is therefore quite possible that accountants may have placed too much emphasis upon refining divisional profit measurement techniques for influencing manager behaviour rather than trying to serve managers with information which better relates to the real multiple corporate goals to which they themselves contribute. In his discussion of divisionalisation of investment decisions, Tomkins[36] takes a small step in this direction when he wonders if there should be less emphasis placed upon the search for overall corporate models and divisional submodels and more time given to the investigation of the optimal degree of independence as suggested by some organisational theorists. This would seem to be a reasonable approach in view of the arguments against goal congruence and would seem to be closer to the spirit and intention of divisionalisation. It should involve the discarding of the directive attitude of accounting measurement and the new concentration upon the autonomous behaviour and aims of the full spectrum of corporate personnel.

The inadequate divisional profit test

If accountants recognise that the performance of divisions can only be judged in relation to the whole corporate 'goal set' then they must be prepared to reject any divisional profit measure as the sole test of performance. Yet the profit test is still receiving major emphasis in the accounting literature. Horngren[37] sees Return on Investment or Residual Income as the quantitative measure best representing top management objectives. Shillinglaw[38] argues that profit-centre decentralisation assumes that the performance of the profit-centre manager is gauged by his reported profit. Divisional accountability[39] is thus treated primarily in terms of the amount of income produced and top management's assessment is again based upon these questionable premises of the primacy of the company profit goal and its accompanying managerial goal congruence.

Solomons[40] claims that the term 'divisionalisation' adds to the term 'decentralisation' the concept of 'delegated profit responsibility' and continues to narrow the accounting perspective of divisional performance measurement in accordance with the classical management perspective:

> Third, since the principal objective of divisional management is the long run maximisation of the division's contribution to the profitability of the corporation as a whole, there is . . . a readily available measure of divisional success in the form of profit contribution.[41]

The mere availability of the profit contribution measure does not automatically imply that it is appropriate or sound yet Solomons advocates the restriction of divisional autonomy should the profit test prove difficult to apply. Any tendency for accountants to preserve measurement techniques that are inappropriate to company activities must risk the eventual bypassing of the accounting system by management altogether, in favour of a broader, possibly more qualitative means of divisional performance measurement.

Moore and Jaedicke[42] do realise that profit as an index of division performance may be inadequate. They feel that it does not account for a division manager's ability to build good customer relations, to secure employee loyalty etc. (even that list is narrow in perspective). Again, however, they return to traditional thinking in looking to the further refinement of profitability index measures. It hardly seems a logical step for accountants to further refine a measure which they consider to be unrepresentative of the total situation. In many firms, however, Caplan[43] argues that profitability is the only criterion that receives serious attention, whereas he suggests that business organisations should try to develop the best possible set of goals and criteria and that in evaluating performance against those criteria, they should remember that the process itself is imperfect. He cites the general empirical findings that single criterion indexes of performance overemphasise that single factor (such as return on investment) to the exclusion of other important factors and that the more pressure that is related to return on investment, the more managers concentrate on that index instead of making decisions that benefit the whole organisation.

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[34] C. Tomkins, *Financial Planning in Divisionalised Companies*, Accountancy Age Books, Haymarket Publishing Co., 1973, p. 143.

[35] *Ibid.*, pp. 6–7.

[36] *Ibid.*, pp. 153–154.

[37] C. T. Horngren, 3rd Edition, *op. cit.*, pp. 698–699.

[38] G. Shillinglaw, 'Divisional Performance Review: An Extension of Budgetary Control', in *Contemporary Cost Accounting and Control*, G. J. Benston (ed.), Dickenson Publishing Co., Belmont, California, 1970, p. 305.

[39] G. Shillinglaw, 'Toward a Theory of Divisional Income Measurement', in *Contemporary Issues in Cost Accounting*, H. R. Anton and P. A. Firmin (eds.), 2nd edition, Houghton, Mifflin & Co., Boston, 1972, pp. 463–464.

[40] D. Solomons, *op. cit.*, p. 3.

[41] D. Solomons, *op. cit.*, p. 9.

[42] C. L. Moore and R. K. Jaedicke, *op. cit.*, p. 544.

The prospect for the further development of, say, return on investment, as a single criterion of divisional performance, should advisedly be considered by accountants as limited. Not only does an undue concentration upon it risk the difficulties outlined by Caplan, but as Hopwood argues, 'beyond some point the search for technical perfection is doomed to failure'.[44] The question of divisional performance measurement is both technical and behavioural. Important aspects may be ignored if accountants focus only upon technical issues.

Top management control

Why should accountants continue to subscribe to the goal congruence concept when its foundations have been subject to so much criticism? One possible reason might be their belief that it serves as a convenient vehicle for top management to exercise ultimate authority and control over all corporate personnel and operations. Indeed it could be argued that the accounting literature concerned with divisional performance measurement does assume the right and ability of top management to control total activity in the company.

Evidence for this underlying assumption in the accounting approach to divisional performance assessment appears fairly readily within the accounting literature. Arrow[45] claims that top management's enforcement rules should encourage the lower level manager to maximise top management goals after which he is rewarded and for this reason top management must have a way of measuring performance. Should accountants offer return on investment as the measure of divisional performance for Arrow's stated purpose, they may be merely acting as tools of, albeit thinly veiled, top management attempts to achieve overall corporate control. Organisation theorists would claim that such complete control is not possible (and to the average accountant, the union presence might be the most immediately tangible evidence for that view).

Horngren, too, suggests that:

> The optimal amount of decentralization is the amount that attains top management's overall objectives most efficiently and effectively.[46]

and that

> The aim is to get a system that will point the managers toward the top management goals.... In addition, incentives must be provided that will spur managers towards those goals.[47]

In doing this, he opts for only one measure and then suggests that accountants concentrate upon defining the measure, measuring components, applying standards and timing feedbacks. Henderson and Dearden[48] argue for a divisional control system which carries out two functions:

> (1) Motivates division managers to make the same decisions that top management would have made if the company were not divisionalised.
> (2) Provides top management with a means of evaluating the effect of division managers' decisions upon the company.

In seeking to improve top management control over divisions, Solomons[49] claims that in the more 'successful' divisionalised companies, divisions are still allowed freedom in their daily operations but are strictly called to account for the results of their operations. This is a somewhat contradictory statement since any 'calling to account' must immediately increase top management control over divisions and therefore may reduce their autonomy.

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[43] E. H. Caplan, *Management Accounting and Behavioral Science*, Addison-Wesley, Reading, Mass., 1971, pp. 103–108.

[44] A. G. Hopwood, *Accounting and Human Behaviour*, Accountancy Age Books, London, 1974, p. 3.

[45] K. J. Arrow, 'Control in Large Organizations', *Management Science*, April 1964, p. 400.

[46] C. T. Horngren, 3rd Edition, *op. cit.*, p. 693.

[47] *Ibid.*, p. 697.

[48] B. D. Henderson and J. Dearden, 'New System for Divisional Control', in *Contemporary Cost Accounting and Control*, G. J. Benston (ed.), *op. cit.*, p. 337.

[49] D. Solomons, *op. cit.*, p. 15.

Moore and Jaedicke[50] add to this view of divisional performance measurement as the means of perpetuating top management control by claiming that top management has no choice but must seek the most 'effective' control device. For this purpose they suggest that accounting measurements are most useful because they allow management by exception. Amey[51], too, demonstrates this bias when he claims that the decentralisation of responsibility is controlled mostly by the use of accounting measurements which are highly centralised. Furthermore, he sees decentralisation of authority and responsibility being related more to the control rather than the planning function of management. He cites one of the conditions laid down by the National Association of Cost Accountants of America for effective divisionalisation of profit responsibility as being 'centrally established and administered policies to coordinate divisional operations in the interests of the company as a whole'.[52] This effective centralised control of divisions is more specifically supported by Amey[53] when he recognises and approves the predominance of centralised asset control in divisionalised companies. This attitude is further demonstrated by Tomkins[54] when he suggests that top management may not be prepared to delegate decisions of 'great importance' (however defined). In general this accounting belief in top management control over divisions is best demonstrated by Shillinglaw[55] and Villers,[56] who treat measures such as 'return on investment' as simplified top management controls over profit-centre managers. They are the means by which answerability is exacted.

The systems view of organisational activity would offer an alternative approach to the emphasis upon accounting controls over divisions.[57] In this view, organisational events have multiple causes generated by long cause-effect chains and any one management action may have second and third level effects beyond any immediate consequence. A systems oriented manager would therefore allow organisational subsystems to adjust when disturbed rather than immediately intervening with a proliferation of controls. Accountants and management of divisionalised companies may have been too eager to adopt the latter course of action to date.

Further evidence of the tight control which top management has retained in divisionalised companies despite the apparent granting of autonomy is provided by a survey of UK companies conducted by Tomkins.[58] In the majority of cases examined, a heavy emphasis upon relatively detailed budgetary control over divisions was discovered (in 42 out of 51 cases, in fact). When asked how often divisions reported to head office, 46 respondents (out of 53) replied that they reported monthly or even more frequently (this involved assessment of divisional profit components). From this Tomkins concluded that divisional autonomy did not appear to be as great as he had at first assumed.

What can be concluded from all of these observations?

(1) It appears probable that top management may often attempt to retain maximum control over company activities while overtly granting autonomy under the guise of divisionalisation.
(2) Accountants have assumed that this should be so and that really top management is the sole originator of overall corporate goals.
(3) Accordingly accountants have concentrated upon developing divisional profit measures which have often been used to enhance top management command over corporate affairs.
(4) The concept of goal congruence may have served as a convenient justification for this bias in accounting activity.

This state of affairs has left accountants with a seemingly insoluble problem in the shape of:

The control-autonomy conflict

> ... it is clear that in the control of the typical organization, perfect decentralization is not possible because of the limitations on enforcement rules associated with uncertainty and risk aversion.[59]

Top management and accountants might take this to mean that in any conflict between top management control and divisional autonomy,

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[50] C. L. Moore and R. K. Jaedicke, *op. cit.*, p. 565.

[51] L. R. Amey, *op. cit.*, pp. 116–120.

[52] *Ibid.*, p. 120.

[53] *Ibid.*, p. 129.

[54] C. Tomkins, *op. cit.*, pp. 143–144.

[55] G. Shillinglaw, 'Divisional Performance Review: An Extension of Budgetary Control', *op. cit.*, p. 305.

[56] R. Villers, 'Control and Freedom in a Decentralized Company', in *Topics in Managerial Accounting*, L. S. Rosen (ed.), McGraw-Hill, Toronto, 1970, p. 186.

[57] D. N. Duncan, 'Training Business Managers in General Systems Concepts', in *Man in Systems*, M. D. Rubin (ed.), Gordon and Breach Science Publishers, New York, 1971, pp. 300–303, 310–311.

[58] C. Tomkins, *op. cit.*, pp. 157–158, 166–167.

[59] K. J. Arrow, *op. cit.*, p. 407.

autonomy must be expensed to preserve control. Moore and Jaedicke[60] point to the conflict when naming the two main advantages of a decentralised company as being delegation of decision-making responsibility to levels lower than top management and motivation of managers in relation to the company's profit objectives. This action, they say, creates the problem of controlling and evaluating division management. There lies the conflict. Independence is apparently granted while control is actually retained, mostly via accounting measurement systems. Moore and Jaedicke further imply that when greater freedom has been granted to division managers, profit control is rendered necessary.

In his discussion of means of attaining optimal corporate effects from divisional decisions, Tomkins really highlights the conflict between control and autonomy:

> If the reader is dissatisfied and feels that no ideal tool has been supplied for providing simultaneously both divisional autonomy and overall optimization of performance, perhaps he should be reminded that he is probably seeking something which cannot exist.[61]

From his examination of divisional transfer pricing models he concludes that most either allow divisional autonomy and thereby risk corporate non-optimality, or require full information to be transmitted to head office or require a lengthy calculation process which may emphasise 'the supervision and watchfulness of the head office'. Once again the emphasis tends to fall upon the accountant's view of the necessity of centralised control of divisions for the maximisation of corporate profitability.

What might be concluded here is that accountants have probably recognised the conflict between control and autonomy in divisional performance measurement but have only considered it from one viewpoint. They appear to have seen the problem as being one of designing accounting measurements which retain maximum top management control of a company while still endeavouring to provide divisions with some feeling of autonomy. Possibly, in the conflict between divisional control and divisional autonomy, accountants have been only too eager to sacrifice the latter. 'Pseudo Participation' was a phrase coined by Argyris[62] denoting the apparent granting by management to employees an effective voice in decision-making while actually taking no notice of their views. This was found in cases to incur hostile and disruptive reactions from employees. Accountants might risk the same fate if divisional personnel perceive them to be encouraging pseudo-divisionalisation.

As Hofstede[63] argues, since control and autonomy can either coexist or conflict, their simultaneous maximisation is unlikely. Companies can at best hope to attain an optimal balance between the two. Decentralisation therefore may be seen as one attempt to do this. Furthermore, it must be remembered that Tannenbaum[64] has demonstrated that the total amount of control in an organisation does not have a rigid, finite limit. The total amount of control can be increased. Increases in the amount of autonomy allowed to divisions will not therefore automatically reduce total existing control. Contingency theory, with its roots in the systems perspective of organisations, is of further assistance here when it emphasises that an organisation should be designed to suit its environment. In this framework, Lawrence and Lorsch[65] argue that the more certain the environment, the more centralised an organisation can be, while the more uncertain the environment, the less centralised an organisation can be. In the former situation, coordination can be achieved through the organisational hierarchy while in the latter situation (an unstable environment) it must be carried out at lower organisation levels where the required knowledge and information are available.

A revised view of divisional performance measurement

The arguments advanced in this paper have a range of implications for the assessment of divisional performance by accountants. Much of the divisional performance literature appears to be based upon a simplistic, unrealistic view of corporate and divisional goals and has often subscribed to the concept of goal congruence while conceding the power of corporate personnel's self-interest. Given the existing range of changing corporate and divisional goals, the divisional profit test taken by itself is inadequate as a measure of any division's progress towards the attainment of the corporate 'goal set'. Its perspective is far too narrow. If accountants wish to claim that they serve the creators of company goals, they should turn their attention to providing performance measures for divisional self-assessment since much of the corporate 'goal set' appears to be generated from the actions of divisional personnel as well as higher management. Furthermore, attempts by accountants to further refine divisional profit measures have been somewhat misdirected, given the need for additional measures of divisional performance.

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[60] C. L. Moore and R. K. Jaedicke, *op. cit.*, pp. 542–543.

[61] C. Tomkins, *op. cit.*, p. 104.

[62] C. Argyris, *The Impact of Budgets on People*, Controllership Foundation, 1952.

[63] C. H. Hofstede, *The Game of Budget Control*, Tavistock Publications, London, 1968, pp. 13–14.

[64] A. S. Tannenbaum, 'Control in Organization', in *Control in Organizations*, A. S. Tannenbaum (ed.), McGraw-Hill, 1968, pp. 3–23.

[65] P. Lawrence and J. Lorsch, *Organization and Environment: Managing Differentiation and Integration*, Harvard University Graduate School of Business Administration, Division of Research, Boston, 1967.

An alternative approach to divisional performance measurement which accountants might adopt for the benefit of the decentralised company as a whole could be described as follows:

(1) Discard the belief that accounting measures should be used to promote goal congruence among division managers.
(2) Recognise the need to preserve some degree of autonomy in divisional operations.
(3) Review the possible methods of assessing divisional performance with a view to accounting for the needs and objectives of all levels of management above and within each division.
(4) Move beyond the single divisional profit-based index to provide an expanded number of measures of divisional performance which account for a broader range of success criteria.

Accordingly accountants ought to be able to bring their expertise to new areas of division performance and to further develop measures for these. Further attention could usefully be paid to the development of divisional productivity indices, projected monetary benefits of the maintenance of certain market positions, costs versus benefits of product development, division social accounts for social responsibility, and human resource accounting for aspects such as personnel development, employee turnover, accident frequency etc. Accounting has done much to facilitate the assessment of divisional profitability and has the resources to be of similar service for assessment of other aspects of divisional performance.

All of these proposals may require a considerable change in the basic attitudes of many accountants toward their role and towards the rights of corporate personnel. Goal congruence appears to have been used as a justification by accountants for their active promotion of maximum top management control over divisional affairs while ostensibly granting divisional autonomy. Accountants may have viewed divisional personnel as objects to be constrained by the use of accounting measures. This would appear to contravene directly their officially pronounced role of serving line departments. Rather, consideration should be given to redesigning the system to serve a broader spectrum of divisional personnel as well as higher management. In today's society many corporate activities have been the subject of public scrutiny and are being adjusted accordingly. Prime examples include employee participation in decision making, the reporting of financial information to employees, increased provisions for employee safety and welfare and the growth of various forms of social responsibility reporting. Accountants have always professed their prime aim as being that of serving information users. In present day society, the identity and needs of those users has expanded and it is in this context that this paper has advocated the redesign of the divisional performance measurement system to serve divisional as well as higher managements.

This proposal does not therefore hinge on any contention of the author's as to what he thinks the modern corporation should be like. It rests upon observations of what corporations have become and what society expects of them. Corporations have been recognised as a coalition of individuals and groups working towards a range of continuously changing goals which originate from their own desires rather than being handed down by some authority. In addition, these corporations now operate in a social and political climate which is causing them to offer lower level employees a more powerful role in daily operations, more rights and more access to corporate information, while at the same time providing the public with more information about the effects of their operations upon society at large and responding to social pressure for changes in policy when required. The expansion of accountants' service from top management to include lower levels of management at division level therefore represents a response to society's present view of what corporations ought to be like and to the observations of organisation researchers as to what corporations are in fact like.

What of the divisional performance measurement system itself? Further investigation into the appropriate degree of divisional independence is required along with the development of measures for divisional self-assessment. Resulting benefits to the company may in fact outweigh the cost of non-optimal corporate decisions made at division level. Finally the diminishing influence of the goal congruence concept would seem to call for a reduction in accountants' emphasis upon the divisional profit test and its incorporation with other performance measures relating to other aspects of division operations. By way of suggestion, accounting researchers could begin to consider some specific performance criteria for different aspects of division operations as outlined below. As should become evident, considerable scope exists for the future development of the composite set of divisional performance indices.

In the first instance, the financial management of divisions might be reflected upon more fairly than by a single profitability index by such information as:

(1) Stock and asset turnover statistics,
(2) Gearing ratios,
(3) Fixed asset statistics such as age of classes of equipment, depreciation policies, levels of maintenance expenditure etc., and
(4) Major sources and applications of funds.

Productivity of a division is admittedly difficult to measure. A rough guide might be profit before interest and tax per employee although such a figure would have to be related to the capital intensiveness of the division's operations and other salient factors. Further refinement of productivity measures calls for further enlightened effort by accounting researchers.

A division's marketing strategy could usefully be assessed with reference to such measures as:

(1) Its achieved volume of sales.
(2) Its current share of the market.
(3) Its estimated product mix related to average contribution margins attained.
(4) Sales effort, efficiency and consumer response ratios such as sales/visits, selling expenses/sales, visits/days, and sales/orders.[66]

Any divisional research and development might be scrutinised by measures such as expenditure percentage of sales, expenditure per employee, actual versus planned cost for progress actually achieved, actual versus planned progress, anticipated excess cost for complete projects, estimated project benefits achieved etc. No single one of these measures could be used in isolation as an accurate representation of a division's research and development effort but some combination could present a reasonable overall impression. A product-line matrix of total research and development effort (in £s or %s) could be designed for two groups of categories such as:

(1) Cost reduction, product improvement, new product design.
(2) General research, applied research, project development.[67]

Some elements of social responsibility accounting might be further developed and applied as divisional performance measures. This again would be a reflection of the variety of goals contained in the division/company 'goal set'. Such measures might take one of the following forms:

(1) Social responsibility budget.
(2) Narrative social responsibility report.
(3) Outlay cost social responsibility report.
(4) Cost-benefit social responsibility report.[68]

Of course much more developmental work is required of accounting researchers in this area.

Employee related information could also be usefully included in this broadened scheme for divisional performance measurement. This would justify continued efforts by accounting researchers in developing means of accounting for company human resources. Accidents occurring in a division could be reflected by measures such as:

(1) Number of accidents causing lost time.
(2) Hours lost as a percentage of hours worked.
(3) Injury costs (developed from tables of hospitalisation costs, convalescence costs, worker compensation costs, and insurance premium increases).

The prevalence of industrial disputes within a division could be reflected by its number of working days lost in a year, hours lost as a percentage of hours planned, and lost contribution margins. Divisional human resource management might also be related to the average staff turnover rate for a period such as 6 months or a year. This could also be presented in monetary terms if average human resources of the division were valued in some way (e.g. on a basis of recruiting, acquisition, training, formal and informal development activities).

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[66] Refer for instance to G. Shillinglaw, *Managerial Cost Accounting*, 4th Edition, Richard D. Irwin, Homewood, Illinois, 1977, pp. 295–317.

[67] Refer for instance to G. Shillinglaw, *Managerial Cost Accounting*, 4th Edition, pp. 744–765. A. Matz and M. F. Usry, *Cost Accounting: Planning and Control*, South Western Publishing Co., Cincinnatti, Ohio, 1976, p. 502.

[68] Refer for instance to L. D. Parker, 'Accounting for Corporate Social Responsibility: The Task of Measurement', *Chartered Accountant in Australia*, October 1977, pp. 5–15.

In conclusion

The above range of divisional performance measures is not an all-inclusive list and may not all be appropriate to each division. Nevertheless they demonstrate a range of possible goals, criteria and related activities which a single profit-based index fails to reflect. At any rate the adoption by a company of an expanded range of divisional performance measures may serve to identify potential long term operational problems in the short term before they actually eventuate so that ex ante corrective or preventative action can be taken. It must also be remembered that it is primarily the division which is being assessed by itself and higher management through these measures and that a division manager could control some components of these measures only to a certain degree. A division cannot be evaluated upon aspects of its operations which are beyond its control. Furthermore accountants should recognise the necessity of combining both qualitative and quantitative approaches to divisional performance measurement. A balanced view of divisional operations is unlikely to result from excessive reliance upon one particular approach only.

Finally some reference must be made to the potential problem of information overload which might result from the adoption of a range of divisional performance measures. Such a problem could most likely be averted by the presentation of the complete group of detailed measures to division managers for their own autonomous use in managing division operations and of a summarised group to higher management for their broader policy purposes. These difficulties in measurement and presentation however are essential aspects of a broadened scheme of divisional performance measurement which, formidable though they may seem, must be confronted by accountants if they are to render the measurement of divisional performance more realistic.

This paper therefore argues for the future development of a matrix of divisional performance measures both by area of operation (financial, market, employee, social etc.) and by degree of divisional controllability. A composite mix of quantitative and qualitative indices is required for balanced assessment of divisional performance. It is a critical problem which urgently awaits the attention of accounting researchers.

Cost Minimisation, Return on Investment, Residual Income: Alternative Criteria for Inventory Models

Wayne J. Morse and James H. Scheiner

Introduction

An important inventory decision model, the Economic-Order-Quantity (EOQ) formula, is based upon a cost minimisation criterion. Since the development of this formula occurred early in the twentieth century[1] in this paper the EOQ formula is identified as the 'traditional model.'

In a recent paper Schroeder and Krishnan developed an alternative inventory order quantity model.[2] Their stated motivation was a concern that the traditional model, because it was developed in the operations research literature, does not view inventories from the standpoint of an owner of a firm. They also noted that although the business finance literature views inventory as an asset, this literature does not *develop* decision rules that can be used for inventory management. Instead, it merely accepts the traditional model developed in the operations research literature. To bridge the gap between the operations research literature and the finance literature they developed an inventory order quantity formula that utilised return on investment (ROI) as a maximisation criterion. They selected ROI because of arguments made in the finance literature that an objective of management in setting asset investment levels is to maximise return on investment.[3]

The purpose of this paper is to examine the traditional and ROI inventory order quantity models and develop yet a third model based upon the concept of residual income (RI). Residual income is defined as the excess of net income over the opportunity cost of invested capital. The rationale for this extension is found in the accounting and finance literature where an argument is made that residual income has certain advantages when compared to ROI as a maximising criterion.[4] By emphasising an absolute amount rather than a per cent, RI is more apt to lead to a congruence between the goals of the organisation and those of individual managers. According to Solomons:

> The reason for preferring to maximize residual income rather than to maximize the rate of return is that the latter may make a manager unwilling to expand investment in the enterprise if it will lower the average rate of return, even though the incremental return is still in excess of cost.[5]

Like Schroeder and Krishnan, in developing an inventory order quantity model based on residual income we hope to bridge the gap between the operations research literature and the accounting/finance literature.

The notation used in this paper is:

S = Demand rate, units/period.
P = Unit selling price, dollars.
K = Set-up or order cost, dollars/batch or order.
C = Unit cost, dollars/unit.
i_1 = Carrying cost, expressed as a per cent of the unit cost/period, exclusive of the opportunity cost of funds tied up in inventory.

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[1] W. E. Camp, 'Determining Production Order Quantity,' *Management Engineering*, January 1922, pp. 17–18; F. E. Raymond, *Quantity and Economy in Manufacture* (McGraw-Hill, 1931).

[2] R. G. Schroeder and R. Krishnan, 'Return on Investment as a Criterion for Inventory Models,' *Decision Sciences*, October 1976, pp. 697–704.

[3] N. Chamberlain, *The Firm: Micro-economic Planning and Action* (McGraw-Hill, 1962); J. C. Van Horne, *Financial Management and Policy* (Prentice-Hall, 1971).

[4] C. T. Horngren, *Cost Accounting: A Managerial Emphasis* (Prentice-Hall, 4th ed 1977); W. J. Morse, *Cost Accounting: Processing, Evaluating, and Using Cost Data* (Addison-Wesley, 1978); D. Solomons, *Divisional Performance: Measurement and Control* (Richard D. Irwin, 1968).

[5] Solomons, p. 64.

i_2 = Opportunity cost of funds tied up in inventory.
Q = Lot size, units.
Q^* = Optimal lot size, traditional model.
ROIQ^* = Optimal lot size, ROI criteria.
RIQ^* = Optimal lot size, RI criteria.
ROI = Period return on investment.
RI = Period residual income.
TC = Total cost.

The following assumptions are made:

1. Demand rate is constant and known (uniform demand).
2. Lead time is deterministic and known.
3. Procurement (or production) is ordered and delivered in batches.
4. Stockouts are not permitted.
5. Costs are known.

For the ROI model, Schroeder and Krishnan also assume the time horizon is sufficiently short so that reinvestment of returns can be ignored. Furthermore, only the certainty case for each model is examined. The introduction of uncertainty will not change the flavour of the analysis.

Previous models

Traditional Model

The traditional model is based upon a criterion of minimisation of the sum of ordering (set-up) and holding costs. The opportunity cost of funds invested in average inventory is considered part of the holding costs. In equation form these total costs are:

$$\mathrm{TC} = \frac{S}{Q}K + (i_1 + i_2)C\frac{Q}{2} \tag{1}$$

For reasons that are apparent later in the paper the holding costs are separated into opportunity costs, i_2, and all other costs, i_1.

Taking the first derivative of equation (1) with respect to Q, setting the result equal to zero, and solving for Q leads to the traditional EOQ formula:

$$Q^* = \sqrt{\frac{2SK}{(i_1 + i_2)C}} \tag{2}$$

As presented above, equation (2) differs from the usual EOQ equation because holding costs are divided into two component parts.

ROI Model

The ROI model is based upon the maximisation of the period return on average inventory investment. Hence,

$$\begin{matrix}\text{Return on}\\ \text{(inventory)}\\ \text{investment}\end{matrix} = \frac{\text{Gross profits of the period}}{\text{Average inventory investment}}$$

or

$$\mathrm{ROI} = \frac{(P - C)S - KS/Q - i_1CQ/2}{CQ/2} \tag{3}$$

The model focuses on gross profits because of the jointness of the costs that are typically deducted from gross profit in determining net income. Costs that are specifically identifiable with individual inventory items could easily be included in equation (3).

Taking the first derivative of equation (3) with respect to Q, setting the result equal to zero, and solving for Q leads to the ROI formula for the economic order quantity:[6]

$$\mathrm{ROI}Q^* = 2K/(P - C) \tag{4}$$

A Comparison

There are a number of important differences between the traditional and ROI order quantity formulas, equations (2) and (4). First, they are based on different criteria. Equation (2) is based on cost minimisation while equation (4) is based on ROI maximisation. Second, equation (2) can be used for raw materials and intermediate products that do not have an external market while equation (4) can only be used for saleable products.[7] Third, equation (2) assumes that S units will be utilised each period regardless of whether or not this is a profitable decision. Equation (4), on the other hand, becomes meaningless if C is greater than or equal to P. Finally, equation (2) explicitly recognises the opportunity cost of inventory investments while equation (4) does not.

To compare the results of using the traditional and ROI models while studying the potential impact of the last difference mentioned above an example concerning some representative product X is developed. Let:

S = 3,000 units/period.
P = \$105/unit.
C = \$100/unit.
K = \$200/order.
i_1 = 0.20.
i_2 = 0.00; 0.10; 0.20; 0.40.

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[6] Schroeder and Krishnan have shown that the second order conditions also hold.

[7] Schroeder and Krishnan acknowledge this limitation.

Table 1
A Comparison of ROI and Traditional Inventory Models

Opportunity Cost of Capital i_2	0.00	0.10	0.20	0.30	0.40
ROI Model					
Order Quantity	80	80	80	80	80
Average Inventory Investment	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
a. Net Income[1]	\$6,700	\$6,700	\$6,700	\$6,700	\$6,700
b. Return on Investment[2]	1.675	1.675	1.675	1.675	1.675
c. Residual Income[3]	\$6,700	\$6,300	\$5,900	\$5,500	\$5,100
Traditional Model					
Order Quantity	245	200	173	155	141
Average Inventory Investment	\$12,250	\$10,000	\$8,650	\$7,750	\$7,050
d. Net Income[4]	\$10,101	\$10,000	\$9,804	\$9,578	\$9,335
e. Return on Investment[5]	0.825	1.000	1.132	1.237	1.324
f. Residual Income[6]	\$10,101	\$9,000	\$8,072	\$7,254	\$6,592
Comparisons[7]					
g. Difference in Net Income (a–d)	\$−4,401	\$−3,300	\$−3,104	\$−2,878	\$−2,635
h. Percentage Difference in Net Income (g/d)	−43.6%	−33%	−31.7%	−30%	−28.2%
i. Difference in ROI (b–e)	0.850	0.675	0.543	0.438	0.351
j. Percentage Difference in ROI (i/b)	50.7%	40.3%	32.4%	26.2%	21%
k. Difference in Residual Income (c–e)	\$−4,401	\$−2,700	\$−2,172	\$−1,754	\$−1,415
l. Percentage Difference in RI (k/c)	−65.7%	−42.9%	−36.81%	−31.9%	−27.75%

[1] $(P - C)S - \frac{KS}{(\mathrm{ROI}Q^*)} - i_1 C \frac{(\mathrm{ROI}Q^*)}{2}$

[2] Net Income/$(C(\mathrm{ROI}Q^*)/2)$

[3] Net Income $- i_2(C(\mathrm{ROI}Q^*)/2)$

[4] $(P - C)S - KS/Q^* - i_1 C(Q^*/2)$

[5] Net Income/$(CQ^*/2)$

[6] Net Income $- i_2(CQ^*/2)$

[7] Negative values indicate the dominance of the traditional model. Positive values indicate the dominance of the ROI model.

The operating results obtained with the use of these models are compared in Table 1. Three widely discussed evaluative measures are used:

(1) Net (accounting) income.
(2) Return on investment.
(3) Residual income.

Net income is the difference between total revenues and total expenses (including the cost of goods sold, all ordering costs, and all out-of-pocket holding costs). Residual income is determined by subtracting the opportunity cost of capital invested in average inventory, $i_2(CQ/2)$, from net income.

Consider the ROI model. The order quantity, average inventory investment, net income, and return on investment do not vary with changes in i_2 because i_2 is not included in their computation. Because i_2 is included in the computation of residual income this later performance measure declines as i_2 increases.

The traditional model does include i_2 in order quantity computations. This leads to declining order quantities and average inventory investments as i_2 increases. Residual income also declines as i_2 increases. However, in this example return on investment increases and approaches the results obtained with the ROI model.

As can be seen in Table 1 for this example, the ROI model outperforms the traditional model on the dimension of return on investment by percentages ranging from 21 to 50. However, the traditional model outperforms the ROI model on the dimensions of net income and residual income. The per cent difference in net income is between 28 and 43. The per cent difference in residual income is between 27 and 65.

Because neither model dominates on all dimensions the example raises several issues. Is one of the models truly superior to the other? Is each appropriate for different circumstances? Are there any conditions under which they lead to identical results? Can residual income serve as an alternative inventory investment criterion? An even more fundamental issue needs to be raised. Is any optimising model appropriate for decisions concerning incomplete segments of an investment package? Inventories are merely part of a much larger investment.

RI model

Let us first consider residual income as an inventory investment criterion. The residual income model is based on the maximisation of net income less a deduction for the opportunity cost of funds invested in average inventory. Hence,

$$\begin{aligned}\text{Residual Income} &= \text{Revenue} - \text{Cost of Goods Sold}\\ &\quad - \text{Ordering Costs} - \text{Out-of-Pocket Holding Costs}\\ &\quad - \text{Opportunity Holding Costs}\end{aligned}$$

or

$$\mathrm{RI} = PS - CS - K(S/Q) - i_1(CQ/2) - i_2(CQ/2) \tag{5}$$

Taking the first derivative of equation (5) with respect to Q, setting the result equal to zero, and solving for Q leads to the following formula for the RI maximising order quantity:

$$\mathrm{RI}Q^* = \sqrt{\frac{2SK}{(i_1 + i_2)C}} \tag{6}$$

Significantly, equation (6) is identical to equation (2), the traditional cost minimising EOQ formula. Despite the fact that equation (2) is based on a cost minimisation criterion and equation (6) is based on an RI maximisation criterion they have two important similarities. First, both assume that S units will be utilised each period regardless of whether or not this is a profitable decision. They minimise cost or maximise RI subject to the constraint that S units will be utilised. Because of this assumption both the traditional and RI models can be used for raw materials, intermediate products that do not have an external market, and unprofitable items that the organisation finds it necessary to stock. Second, both equations (2) and (6) explicitly recognise the opportunity cost of inventory investments. Hence, the phrase 'RI model' could be substituted for the phrase 'traditional model' in Table 1. The analysis would remain unchanged.

Identical Results

The major difference between the traditional and RI models, and the ROI model is that the former models include an opportunity cost for average inventory investment while the latter does not. It is possible, by setting equation (4) equal to equations (2) and (6), to determine the value of i_2 at which all models will lead to identical results.

$$\frac{2K}{(P - C)} = \sqrt{\frac{2SK}{(i_1 + i_2)C}} \tag{7}$$

$$i_2 = \frac{S(P - C)^2}{2KC} - i_1 \tag{8}$$

For our previous example:

$$i_2 = \frac{3{,}000(105 - 100)^2}{2(200)(100)} - 0.20 = 1.675$$

In all cases where equation (7) holds the solutions using all three models will be identical. When $i_2 < S(P - C)^2/2KC - i_1$ the traditional and RI models will outperform the ROI model on the dimensions of net income and residual income. The ROI model will dominate on the dimension of ROI. The example in Table 1 illustrates this point. If

$$i_2 > \frac{S(P - C)^2}{2KC} - i_1,$$

ROI will dominate on the dimensions of ROI and net income for the initial time period.

Optimising Total Investments

In using any decision model for incomplete segments of an investment package, management must be concerned with the congruence of the segmental and firm-wide decision models. Sometimes, by using ROI for inventory investments a manager might not maximise firm-wide goals, *even if the firm-wide goal is to maximise ROI.*

The following example emphasises this difficulty. The firm considered in the previous example will be continued with a 10% cost of capital. The firm's inventory makes up approximately 17% of total assets.[8] Assume further that the firm has estimated accounting income for the period of \$100,000 without the additional sales. Total assets are \$1 million. Hence return on investment before the decision is made is 10%. Using the ROI model for inventory order quantities, net income would be \$106,700 and total assets, \$1,004,000, for an ROI of 10.63. However, using the traditional and residual income models net income would be \$110,000 and total assets \$1,010,000 for an ROI of 10.89%. From a firm-wide point of view maximising ROI on inventory may not maximise total ROI.[9]

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[8] These percentages are based on several large US retail chains.

[9] Hence the use of the ROI model is only appropriate when:

$$\Delta A_{\mathrm{TM}} > \Delta A_{\mathrm{ROI}} + \frac{A(\Delta \mathrm{I}_{\mathrm{TM}} - \Delta \mathrm{I}_{\mathrm{ROI}})}{\Delta A_{\mathrm{ROI}}(\mathrm{NI} + \Delta \mathrm{I}_{\mathrm{ROI}})}$$

where

A = Total Assets

ΔA = Change in total assets resulting from indicated (either ROI or traditional) model (TM)

NI = Net Income

ΔNI = Change in net income resulting from indicated model.

This difficulty would not occur if RI were used for inventory models and maximising RI was the firm-wide goal. Using the data in the previous example, residual income would be $6,300 if the ROI model were used and $9,000 if the RI model were used. It appears that RI is a better optimising model for segments of a business. This is so because it is based on marginal analysis. If i_2 is the organisation's opportunity cost of capital, inventory investments should be made to the point where the resulting net income (or cost saving) is equal to the opportunity cost of additional inventory investment.

Conclusions

One of Schroeder and Krishnan's objectives in developing the ROI order quantity model was to bridge the gap between the operations research and the finance literature. They believed that certain benefits could be obtained by using alternative criteria in model development. While they developed an alternative order quantity model, it cannot be said that they bridged the gap between the operations research and finance literature.

Because equations (2) and (6) are identical, this paper has, in fact, bridged the gap between the traditional economic order quantity model found in the operations research literature and an investment criterion found in the accounting/finance literature. The development of the RI model allows us to bring a large segment of the accounting/finance investment literature to bear on inventory investment decisions. Utilising this literature we can find additional advantages of equations (2) and (6) over equation (4). If i_2 is the organisation's opportunity cost of capital, inventory investments should be made to the point where the resulting net income (or cost saving) is equal to the opportunity cost of additional inventory investment.

From a pedagogical viewpoint the development of the residual income model is also superior to the traditional model. The underlying maximisation criterion is similar to that used in curvilinear cost-volume-profit models and in capital expenditure models. Because of the similarity between inventory investments and investments in other assets it seems appropriate to use similar criteria for both. Following this train of thought it might ultimately be possible to introduce inventory investment models in cost accounting or finance courses as a brief appendix to capital budgeting. This would release valuable time to cover other topics.

Risk Distribution in the Budgetary Process

David Otley and Anthony Berry

Budgeting has always been a problematic process. At the end of a budget period it is invariably found that some managers have been able to achieve their budget targets more successfully than others. But when senior managers come to evaluate their subordinates' performance they have to recognise that some apparent success is caused by certain managers having had easier budgets to attain in the first place. That is, the difficulty of budget targets is likely to vary between one manager and another. Further, it has often been recommended that budgets should be seen as targets that will be achieved only a proportion of the time. In order to motivate the best possible actual performance it is suggested[1] that a budget should be pitched at a more difficult level than the performance actually expected. Although such a target will not, on average, be attained it is nevertheless believed that it will motivate managers to achieve a better result than if the budget had been set at a lower level. It is not the purpose of this paper to argue the case for or against the use of budgets as motivational targets. Rather we take as our starting point the observation that budgets are often, in practice, set at levels other than the performance which is expected to occur, and to examine some implications of this observation.

Motivational factors are not the only reason why budgets may be set at levels other than those expected to be attained. Even budgets which managers intend to be good estimates of expected performance (which we will call Expectation Budgets) may be subject to bias by their subordinates in both upward and downward directions.[2] A number of studies have indicated that such budget bias is a common feature of the budgetary process in many types of organisation and is essentially motivated by the desire of junior managers to be favourably evaluated by their superiors.[3] Thus junior managers currently in a strong position may bias their budgets downwards in order to give themselves an easier standard to achieve in the subsequent period. Conversely, managers currently in a weak position may bias their budget upwards so as to make it appear that, despite current problems, the future is bright.

There may be a further reason for Non-Expectation Budgets. It has been suggested that the statistical distribution of costs and revenues in many organisations is likely to be skew rather than symmetrical.[4] That is to say, errors to one side of a most likely outcome can be more extreme than on the other, as illustrated in Figure 1.

The argument for skewness is intuitively appealing. A certain level of cost is likely to be incurred; spending much less than this amount (at a given level of output) is increasingly improbable whereas almost any degree of overspending is possible. Similarly, a certain level of revenue may be thought likely, but it may not materialise; any great increase in revenue is rather less probable than a similar decrease. If such a situation exists then budgets set without any thought for motivational manipulation or any attempt at bias by subordinates (or superiors, for that matter!) may still not represent expectations. Typically the figure submitted as a budget will be the most

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[1] Hofstede, G., *The Game of Budget Control* (London, Tavistock, 1968).

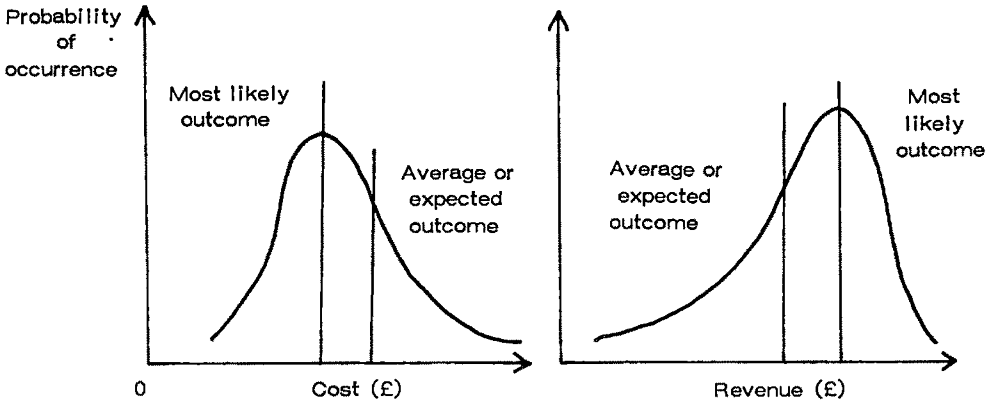
[2] For the sake of clarity of exposition we will consider budgets, such as output and revenue budgets, where a higher figure represents better performance and a lower figure worse performance. For other types of budget, such as cost budgets, where the reverse is true, the argument is still valid but references to up and down, higher and lower etc. should be reversed.

[3] See for example, Lowe, E. A. and Shaw, R. W., 'An Analysis of Managerial Biasing: Evidence from a Company's Budget Process', *Journal of Management Studies*, October 1968, pp. 304–315. Other studies are reviewed in Otley, D. T., *Behavioural Aspects of Budgeting*. Accountants Digest Number 49 (London, ICAEW, 1977).

[4] Turvey, R. in Luck, G. M. *et al*, 'The Management of Capital Investment', *Journal of the Royal Statistical Society*, Series A, 134, 4, 1971.

Figure 1

Distributions of Costs and Revenues Having Positive and Negative Skewness


Probability of occurrence
Most likely outcome
Average or expected outcome
0
Cost (£)
Average or expected outcome
Most likely outcome
Revenue (£)

likely outcome, for this represents a real event familiar to the manager in charge. But this most likely outcome differs from the long-run expectation of outcomes as shown in Figure 1. As an extreme example consider the number of children expected to be included in a family. No doubt most parents will plan on the basis of one, or two, or three (or any integer) despite the national average outcome of 2.4 children per family! Similarly a manager is much more familiar with commonly occurring outcomes, and will plan and budget on such a basis, without concerning himself about overall averages.

However, although individual managers may quite rightly be concerned with the specific details of their own particular cases, senior managers have necessarily to consider the overall performance of the aggregate of units for which they are responsible. It is suggested that in many cases, for one of the reasons discussed above, budgets will be set at levels other than those that are expected to be achieved as a long-run average. It is the aim of this paper to show that even quite mild deviations from Expectation Budgets at the unit level can produce severe distortions when the budgets are aggregated to an overall organisational level. In addition, although senior managers may attempt to adjust budgets to remove some of this distortion, it will be shown that one common method of adjustment can produce further distortions at unit level. Thus it is imperative that those concerned with the aggregation of budgetary information are fully aware of the effects demonstrated here, so that appropriate educative action can be taken.

A simple case

Consider the very simple case where a number of subordinate managers are each in charge of operating units producing a single product, having identical characteristics and reporting to a single superior. We shall also suppose that all managers submit output budgets having an identical chance of achievement. Although this is an idealised situation it serves to illustrate some of the most important characteristics of the budget aggregation process.

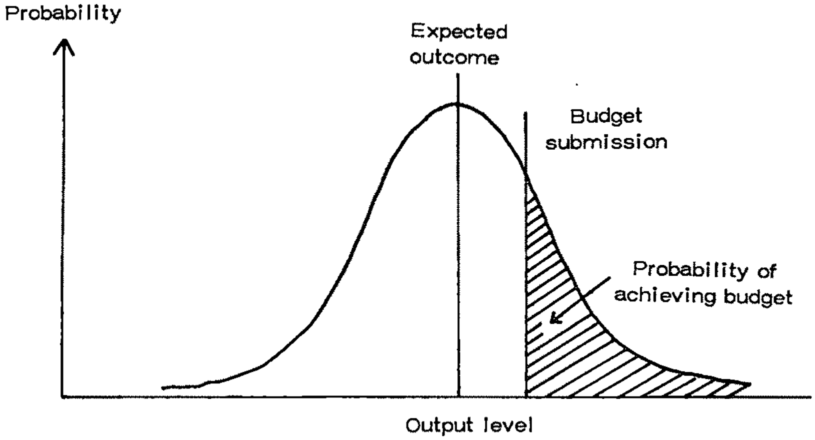
For the sake of concreteness we shall assume that the underlying distribution of output follows a Normal distribution. This assumption is not necessary for the argument, which applies to any underlying distribution (including skew distributions), but it serves to keep illustrative computation to a minimum. Thus each individual manager's budget submission can be represented by the diagram shown in Fig. 2.

The shaded area on the diagram represents the probability that the budget submission will be achieved (or over-achieved). We may now calculate the probability that the sum of the budgets of all the unit managers, which has been aggregated by the senior manager to form his own budget, will be achieved in a particular case.

Let us suppose that the distribution of output has an expected value of 1,000 tons and a standard deviation of 200 tons for each manager. It may readily be demonstrated, using tables of the Normal distribution, that if a unit manager submits a budget of 1,104 tons such a budget will be attained approximately 30% of the time. Further

Figure 2

A Non-Expectation Budget Based on a Normal Distribution of Output



assuming that we have 9 such managers who operate units which are independent of each other and who submit identical budgets, the senior manager will have an aggregate budget of (9 × 1,104) = 9,936 tons.

In order to calculate the likelihood of the senior manager achieving such an aggregate level of output it is necessary to note that the distribution of output for the senior manager is:

(a) also Normal in shape

(b) has an expected value of 9 × 1,000 = 9,000 tons

(c) has a standard deviation of $[\sqrt{(9 \times 200)^2}]$ = 600 tons

A budget of 9,936 tons thus lies some [(9,936 − 9,000)/600] = 1.56 standard deviations from the mean and consequently has a probability of achievement of about 6%, as shown in Table 1.

The effect is thus quite startling. Each of nine managers submit budgets having the quite reasonable chance of achievement of 30%. When these are added together they result in a budget having the much reduced chance of achievement of 6%. A tight motivational budget aggregates into an impossible target. This is not a quirk of the particular figures, for, as Table 2 shows, the effect of aggregating budgets of varying degrees of difficulty produces similarly extreme effects.

It is evident that as the individual budget becomes attainable only slightly less than 50% of the time the aggregate budget's chance of attainment diminishes rapidly. Conversely, if the individual budget becomes attainable only slightly over

Table 1

Aggregation of Nine Identical Budget Submissions

Unit	*Expected Output*	*Standard Deviation*	*Submitted Budget having a 30% chance of Attainment*
A	1,000	200	1,104
B	1,000	200	1,104
C	1,000	200	1,104
D	1,000	200	1,104
E	1,000	200	1,104
F	1,000	200	1,104
G	1,000	200	1,104
H	1,000	200	1,104
I	1,000	200	1,104
Aggregate	9,000	600	9,936

Aggregate budget has 6%chance of attainment as it lies (9,936 − 9,000)/600 = 1·56 standard deviations from its mean.

Table 2

Probabilities of Aggregate Budget Achievement when 9 Identical Individual Budgets are Combined*

Probability of Individual Manager Attaining Budget (%)	*Probability of Aggregate Budget being Attained* (%)
90	99·994
80	99·400
70	94·200
60	77·500
50	50·000
40	22·500
30	5·800
20	0·600
10	0·006

*It should be noted that this Table is symmetrical about the 50% point. If (100 – percentage) is calculated for any row, a duplicate of another row in the Table is found. This is a consequence of the Normal Distribution being symmetrical. Following Tables only consider chances of achievement less than 50% as the equivalent results for chances in excess of 50% can be calculated in a similar fashion.

50% of the time then the attainment of the aggregate budget becomes a near certainty. To illustrate the point further, Table 3 gives the same information but for collections of subordinate managers varying in size from 2 to 100.

Inspection of Table 3 indicates that as the number of budgets aggregated increases the rate at which budgeting optimism expands is explosive. Even the mild optimism of a budget which is attainable 40% of the time becomes attainable only 10% of the time when 25 such budgets are aggregated. A target budget attainable on one occasion out of every five is attainable in aggregate on only one occasion in every hundred when as few as seven such budgets are aggregated. Thus the loss of credibility when quite mildly optimistic budgets are aggregated is a potentially serious problem.

Table 3

Probabilities of Achievement of Aggregate Budget for Varying Numbers of Unit Budgets (%)

Number of Budgets	*Probability of Unit Budget being Attained*								
Aggregated	50%	45%	40%	35%	30%	25%	20%	15%	10%
2	50	43	36	29	23	17	12	7	4
3	50	41	33	25	18	12	7	4	1
4	50	40	31	21	15	9	5	2	0.5
5	50	39	29	19	12	7	3	1	0.2
6	50	38	27	17	10	5	2	0.6	0.1
7	50	37	25	15	8	4	1	0.3	*
8	50	36	24	14	7	3	0.9	0.2	*
9	50	35	22	12	6	2	0.6	0.1	*
10	50	34	21	11	5	2	0.4	*	*
12	50	33	19	9	4	1	0.2	*	*
14	50	32	17	8	3	0.6	0.1	*	*
16	50	31	16	6	2	0.3	*	*	*
18	50	30	14	5	1	0.2	*	*	*
20	50	29	13	4	1	0.1	*	*	*
25	50	26	10	3	0.4	*	*	*	*
30	50	25	8	2	0.2	*	*	*	*
40	50	21	5	0.7	*	*	*	*	*
50	50	19	4	0.3	*	*	*	*	*
100	50	10	0.6	*	*	*	*	*	*

*Less than 0.1%.

Table 4

Aggregation of Budgets for Units of Different Size but Constant Standard Deviation

Unit	*Expected Output*	*Standard Deviation*	*Submitted Budget having a 30% Chance of Attainment*
A	500	200	604
B	625	200	729
C	750	200	854
D	875	200	979
E	1,000	200	1,104
F	1,250	200	1,354
G	1,500	200	1,604
H	1,750	200	1,854
I	2,000	200	2,104
Aggregate	10,250	600	11,186

Aggregate budget has a 6% chance of achievement as it lies (11,186 – 10,250)/600 = 1·56 standard deviations from its mean.

Table 5

Aggregation of Budgets for Units of Different Size and Standard Deviations

Unit	*Expected Output*	*Standard Deviation*	*Submitted Budget having a 30% Chance of Attainment*
A	500	80	542
B	625	100	677
C	750	120	813
D	875	140	948
E	1,000	160	1,084
F	1,250	200	1,355
G	1,500	240	1,626
H	1,750	280	1,897
I	2,000	320	2,168
Aggregate	10,250	600 (*approx*)	11,110

Aggregate budget has a 6% chance of achievement as it lies (11,174 – 10,250)/600 = 1·53 standard deviations from its mean.

Units of different size

The simple example so far developed can be extended by considering non-identical operating units. A simple example of unit differences is where units are essentially similar, but differ solely in terms of their size. Perhaps a reasonable range to consider is where units range in size from one-half as large to double the size of some typical unit. Initially we will assume that the standard deviation of units' output does not vary, although this assumption will be relaxed as we proceed. The results of aggregation are shown in Table 4.

It can thus be seen that differences in size as such have no effect on the problems inherent in the aggregation process. However, it is likely that the standard deviation will also vary with unit size.

Table 5 shows the effect of aggregation where both size and standard deviation vary together in a linear fashion.

The results of aggregation are only slightly different in this case and the difference may be accounted for in the adjustment of the standard deviation for the typical unit (E) from 200 to 160 in order to keep the standard deviation of the aggregate constant from table to table.

Finally it may be argued that neither of the above examples is particularly realistic. The standard deviation of a unit's output is likely neither to remain constant regardless of size nor to vary in a strictly linear fashion. If the general argument of this paper is correct, it is perhaps most reasonable to suppose that the truth typically lies between these extremes and that the standard de-

Table 6

Aggregation of Budgets for Units of Different Size with Standard Deviation Proportional to the Square Root of Size

Unit	*Expected Output*	*Standard Deviation*	*Submitted Budget having a 30% Chance of Attainment*
A	500	135	571
B	625	145	701
C	750	160	834
D	875	175	967
E	1,000	190	1,100
F	1,250	210	1,360
G	1,500	230	1,621
H	1,750	250	1,881
I	2,000	265	2,139
Aggregate	10,250	600	11,174

Aggregate budget has a 6% chance of achievement as it lies (11,174 – 10,250)/600 = 1·53 standard deviations from its mean.

viation is most likely to vary as the square root of unit size.[5] The results of aggregation under this assumption are shown in Table 6.

It is therefore apparent that regardless of the assumptions made about the way in which the standard deviation varies with size, a significant reduction in probability of aggregate budget achievement occurs when individually mildly optimistic budgets are aggregated.

Independence of operating units

It has been assumed in the previous analysis that operating units are (statistically) independent of each other. That is, variations in the output of one unit are not related to variations in the output of other units. Such an assumption is undoubtedly plausible in some cases. For example, the output of coal from coal mines operated by the same concern tends to follow such a pattern, because variations in consumer demand are buffered by stockpiles and individual units attempt to maximise the output from a given set of physical resources. However, in other cases, it is likely that variations in economic conditions and other environmental factors will affect all units simultaneously and thus cause correlated changes in unit outputs. For example, the sales of different shops selling the same products in a retail chain will tend to show some correlation with each other. The result of such correlation will be to reduce the aggregation effect demonstrated above. However, even quite high levels of correlation will only reduce the effect rather than eliminating it.

Thus although the existence of interdependence between operating units reduces the effect discussed here, to remove it altogether would require perfect correlation, a condition most unlikely to occur in practice. Again, the degree of independence of operating units can be established empirically in practical applications.

The results so far

We have noted the following effects:

(a) Budget estimates which are initially submitted as mildly optimistic forecasts become grossly optimistic when aggregated. Conversely, estimates which are initially pessimistic aggregate into grossly pessimistic estimates.

(b) This effect becomes more pronounced
  (i) the greater the degree of initial optimism (or pessimism);
  (ii) the greater the number of units that are aggregated;
  (iii) the greater the degree of independence between operating units.

(c) Quite reasonable degrees of optimism from relatively small numbers of managers give rise to marked changes in probabilities of achievement, e.g.

  (i) 9 managers submitting budgets with a 30% chance of achievement yields an aggregate budget having only a 6% chance of achievement.
  (ii) 20 managers submitting budgets with a

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[5] The basis of this argument is that successive increments of output are independent of each other. Thus is a unit is doubled in size the standard deviation of its output will increase, but only by a factor of $\sqrt{2}$. This argument is essentially similar to that illustrated for a nine-fold aggregation in Table 1.

Table 7

Effect of Reduction of Aggregate Budget on Size and Probability of Attainment of Unit Budgets

	Original Budget	*Amended Budget*
Unit	1,104 (30%)	1,035 (43%)
Aggregate	9,936 (6%)	9,315 (30%)

40% chance of achievement yields an aggregate budget having only a 13% chance of achievement.

Although these results refer to the case of complete independence, there would still be significant differences in the likelihood with which unit and aggregated budgets would be met, even when quite high levels of interdependence exist.

A possible solution

It is evident that the effect discussed in this paper can be very serious. It is particularly potent in that it becomes more extreme as one ascends the organisational hierarchy. Herbert Simon once pointed out that if in a five-tier organisation each subordinate told his boss 90 per cent of the truth the overall superior would hear only two-thirds of the truth. If a span of control of eight subordinates at each level is assumed, it can be calculated that if each subordinate submits a budget having a 49% chance of attainment (i.e. a chance only 1% different to evens) the aggregate budget is attainable only 5% of the time. Evidently some mechanism for dealing with this escalation of optimism is required.

Not surprisingly, organisations have developed methods of coping with this problem.[6] Most budget procedures have some mechanism to allow superiors to adjust the budget estimates submitted by their subordinates so as to produce better estimates at each hierarchical level. If the global estimate appears too optimistic then it is reduced. However, perhaps for the sake of arithmetic tidiness, the figures that comprise the aggregate are also reduced, often in proportion to the original submissions. That is, it is ensured that the revised budget estimates add up to the amended budget total. The remainder of this paper concerns itself with showing how this requirement of arithmetic balancing can produce some unfortunate side-effects.

The original case

When applied to the original example, the result of budget amendment in this way is unremarkable. In Table 1, individual budgets having a 30% chance of attainment were aggregated into an overall budget which has shown to have a 6% chance of attainment. Let us suppose that it is desired to increase this 6% chance to a 30% chance. To do this the aggregate budget must be reduced from 9,936 to 9,315, that is a reduction of 621. If this is allocated equally between the nine units each of their budgets is reduced from 1,104 to 1,035. These amended budgets can be shown to have a 43% chance of attainment. The result of the operation is summarised in Table 7.

It can be seen that, although unit budgets still remain easier to achieve than the aggregate budget, the effect of reducing each unit budget *pro rata* to the aggregate reduction leaves each unit budget with an equally enhanced probability of attainment. The degree of optimism remaining in the unit budgets can be seen by making corresponding calculations for all the cases shown in Table 2, with results as shown in Table 8.

Thus, in the case of identical operating units, a simple *pro rata* operation appears to produce results which are at least equitable between individual units, although their motivational impact is likely to have been altered.

Units of different size

However, it is when the above method is applied to units of different size that problems arise. To illustrate these problems we will apply the method to the examples already given in Tables 4, 5 and 6, which yield the results given in Tables 9, 10 and 11. Inspection of these Tables indicates that, in general, the *pro rata* method of budget amendment gives rise to a further problem. Although the average probability of attainment for the revised unit budget still remains around 42%, different units now have significantly differ-

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[6] For two case studies illustrating different budget processes see Berry, A. J. and Otley, D. T., 'The Aggregation of Estimates in Hierarchical Organisations', *Journal of Management Studies*, May 1975, pp. 175–193.

Table 8

Probabilities of Unit Budget Attainment when Aggregate is Adjusted to Same Probability as Original Unit Submissions (9 Units)

Probability of Original Unit Budget being Attained (%)	*Probability of Original Aggregate being Attained* (%)	*Probability of Revised Aggregate being Attained* (%)	*Probability of Revised Unit Budget being Attained* (%)
90	99·994	90	66·5
80	99·4	80	61·0
70	94·2	70	57·0
60	77·5	60	53·4
50	50	50	50
40	22·5	40	46·6
30	5·8	30	43·0
20	0·6	20	39·0
10	0·006	10	33·5

Table 9

Budget Amendment: Units of Different Size but Constant Standard Deviation

Unit	*Expected Output*	*Standard Deviation*	*Original Submission* (*30%*)	*Revised Submissions*	*Probabilities of Attainment* (%)
A	500	200	604	570	36·3
B	625	200	729	688	37·6
C	750	200	854	807	38·8
D	875	200	979	925	40·1
E	1,000	200	1,104	1,043	41·5
F	1,250	200	1,354	1,279	44·2
G	1,500	200	1,604	1,515	47·0
H	1,750	200	1,854	1,751	49.8
I	2,000	200	2,104	1,987	52.2
Aggregate	10,250	600	11,186 (6%)	10,565 (30%)	

Table 10

Budget Amendment: Units of Different Size and Standard Deviation

Unit	*Expected Output*	*Standard Deviation*	*Original Submission* (*30%*)	*Revised Submission*	*Probability of Attainment* (%)
A	500	80	542	515	42·5
B	625	100	677	644	42·5
C	750	120	813	773	42·5
D	875	140	948	901	42·5
E	1,000	160	1,084	1,031	42·5
F	1,250	200	1,355	1,289	42·5
G	1,500	240	1,626	1,546	42·5
H	1,750	280	1,897	1,804	42·5
I	2,000	320	2,168	2,062	42·5
Aggregate	10,250	600 (*approx*)	11,110 (7%)	10,565 (30%)	

Table 11

Budget Amendment: Units of Different Size with Standard Deviation Proportional to the Square Root of Size

Unit	*Expected Output*	*Standard Deviation*	*Original Submission (30%)*	*Revised Submission*	*Probability of Attainment (%)*
A	500	135	571	540	38·4
B	625	145	701	663	39·7
C	750	160	834	788	40·6
D	875	175	967	914	41·2
E	1,000	190	1,100	1,040	41·6
F	1,250	210	1,360	1,286	43·2
G	1,500	230	1,621	1,533	44·5
H	1,750	250	1,881	1,778	45·4
I	2,000	265	2,139	2,023	46·5
Aggregate	10,250	600 (*approx*)	11,174 (6%)	10,565 (30%)	

ent chances of attaining their budget ranging from 36% to 52% in the case of a constant standard deviation and 38% to 46% in the more realistic case of a standard deviation which varies as the square root of unit size. Only when the standard deviation is linearly proportional to the unit size does the difference disappear. Except in this special case, the apparently straightforward method of budget amendment *pro rata* to the original budget submissions produces inequities between operating units. In particular it should be noted that the larger units get the better deal; smaller units get relatively unfavourable treatment.

Despite this inequity it might be argued that in realistic cases the size of the discrepancy is relatively small and can be ignored. Whereas this may be arguable in the above examples where standard deviations are small in comparison with means, this does not always hold. Most importantly it usually does not hold when profit budgets are considered.

Application to profit budgets

In this context the most important feature of a profit budget is that it represents a small difference between two relatively large and uncertain estimates, that is revenues and costs. In statistical terms this implies that the standard deviation of profit will be large relative to its absolute value. Thus it would be quite reasonable to expect profits of, say, £100 but having a standard deviation of £200, implying that one has 95% confidence that the final figure will lie between a profit of £500 and a loss of £300. The application of our budgetary procedures to nine identical such units is shown in Table 12.

So far no problems are apparent, but the situation is similar to that outlined in Table 7. Where

Table 12

Profit Budgets for Nine Identical Units

Unit	*Expected Profit*	*Standard Deviation*	*Budget Submission (30%)*	*Revised Budget*	*Probability of Attainment (%)*
A	100	200	205	135	43·0
B	100	200	205	135	43·0
C	100	200	205	135	43·0
D	100	200	205	135	43.0
E	100	200	205	135	43·0
F	100	200	205	135	43.0
G	100	200	205	135	43.0
H	100	200	205	135	43.0
I	100	200	205	135	43·0
Aggregate	900	600	1,845 (6%)	1,215 (30%)	

Table 13
Profit Budgets for Nine Dissimilar Units

Unit	*Expected Profit*	*Standard Deviation*	*Budget Submission (30%)*	*Revised Budget*	*Probability of Attainment (%)*
A	−400	200	−295	−98	6
B	−300	200	−195	−65	12
C	−200	200	−95	−32	20
D	−100	200	5	2	31
E	0	200	105	35	43
F	100	200	205	68	56
G	200	200	305	102	69
H	300	200	405	135	80
I	400	200	505	168	88
Aggregate	0	600	945	315	
			(6%)	(30%)	

all units are identical most budgetary processes produce similar and non-controversial results. However, we now turn to units expected to produce dissimilar levels of profit. We shall assume that the standard deviation of profit is the same for all units, which is perhaps reasonably realistic. If not, the effect of having different standard deviations will be to increase the variability between units above that shown in Table 13.

Inspection of Table 13 shows a similar pattern to that found in Table 9, but in a much more extreme form. The budget amendments used to give the revised budgets for each unit are obviously quite inappropriate. Large budgeted losses are reduced, making them even less likely to be achieved, whereas large budgeted profits are also reduced giving them much improved chances of being attained. Note also that a budget submission of zero profit would always remain as zero regardless of the underlying circumstances. Evidently the *pro rata* reduction of budget submissions gives absurd results and would almost certainly never be used in practice on profit budgets.

However, it is worthwhile to ponder over the figures to consider what kind of amendment process would give more sensible results. What seems to be required is a reduction of all budget submissions by a similar amount. Perhaps the difference between the aggregate submission and the revised aggregate could be evenly spread over all budget submissions i.e. (945 − 315)/9 = 70. The results of this process are shown in Table 14.

This has obviously achieved the desired result, namely an equitable distribution of the budget reduction to each unit. And this example can give us the clue in devising a basis for a fair means of allocating budget changes in the more general case. For the method works here because the

Table 14
Profit Budgets Amended by Equal Deductions

Unit	*Expected Profit*	*Standard Deviation*	*Budget Submission (30%)*	*Revised Budget*	*Probability of Attainment (%)*
A	−400	200	−295	−365	43
B	−300	200	−195	−265	43
C	−200	200	−95	−165	43
D	−100	200	5	−65	43
E	0	200	105	35	43
F	100	200	205	135	43
G	200	200	305	235	43
H	300	200	405	335	43
I	400	200	505	435	43
Aggregate	0	600	945	315	
			(6%)	(30%)	

Table 15

The General Method Illustrated

Unit	*Expected Output*	*Standard Deviation*	*Original Budget Submission (30%)*	*Revised Budget*	*Probability of Attainment (%)*
A	500	135	571	524	43
B	625	145	701	651	43
C	750	160	834	779	43
D	875	175	967	906	43
E	1,000	190	1,100	1,034	43
F	1,250	210	1,360	1,287	43
G	1,500	230	1,621	1,542	43
H	1,750	250	1,881	1,794	43
I	2,000	265	2,139	2,048	43
Aggregate	10,250	600 *(approx)*	11,174 (6%)	10,565 (30%)	

Note: The sum of the standard deviations is 1,760. The difference between the revised aggregate and the aggregate submission (i.e. 10,565 − 11,174 = −609) is divided between units *pro rata* to their standard deviation, e.g. unit A's submission of 571 is reduced by (135 × 609/1,760) = 47 units, giving a revised budget of 524.

standard deviations in Table 14 are identical for all units.

A general method

The previous result can now be generalised. The expected value of a budget submission is irrelevant to any proposed modification process designed to give equitable results. It is the variability of the output process, measured here by the standard deviation, that is of paramount importance. *Thus, to preserve equity any change in an aggregate budget estimate should be allocated to units in proportion to the standard deviation of their estimates rather than in proportion to the absolute value of the estimates themselves.*

This result indicates why we found no problem in allocating budget changes to identical units, and also why Table 10 somewhat unexpectedly turned out to show an equitable distribution (for in the case discussed there, standard deviations were proportional to expected values and thus to unit budget submissions).

To illustrate the point we will rework the budget amendment process according to our new model for the data originally shown in Table 11. That is, the difference in the aggregate budget submission and the revised aggregate will be allocated to units in proportion to their standard deviations giving the results shown in Table 15.

It can be seen that this method produces the desired equitable result although there will always be a difference between the units' chance of attaining their individual budgets and the chance of the aggregate budget being achieved (unless these are both 50%). To avoid this latter effect would require the sacrifice of a certain amount of arithmetic tidiness, namely that the budgets would no longer add up. However, it can now be seen that there may be strong arguments in favour of non-additive budgets. For example, to preserve equity between operating units and the aggregate corporate entity, it might be most fair to keep the original budget submissions of the units (as shown in Table 15) whilst reducing the aggregate budget from the arithmetic sum of the unit budgets to the figure having a 30% chance of attainment itself (10,565 tons). No doubt the difference between the two figures could be carried in an account similar to that used for planning variances[7] and perhaps be called a motivational variance!

This would also overcome a severe practical difficulty, namely that although the original *pro rata* amendment is easily implemented in practice (because all the information required is in the budget submissions themselves) the proposed amendment method requires knowledge of standard deviations which are not easily estimated. Equitable amendment may therefore pose great practical problems in implementation, regardless of the possible behavioural effects on unit managers.

One objection to the analysis that has been conducted is that it has assumed that all unit managers have biased their budget estimates in

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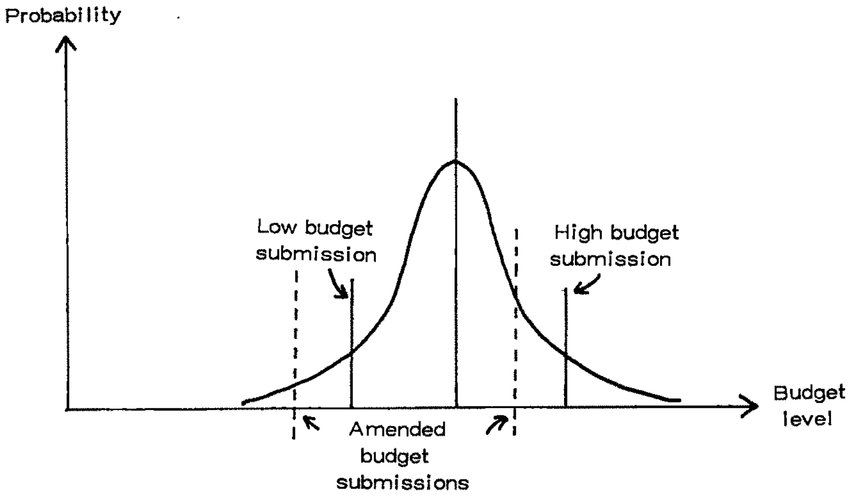
[7] See, for example, the discussion in Amey, L. R. and Egginton, D., *Management Accounting: A Conceptual Approach*, (London, Longmans, 1973) Chapter 15, p. 490.

Figure 3
Amendment of Optimistic and Pessimistic Budget Submissions



the same direction. That is, all budget estimates are either above or below the expected outcome by an amount that gives them identical chances of attainment. Desirable though such a state of affairs might be, it would be most unusual for subordinates to behave in identical ways. Indeed the common 'swings and roundabouts' view would suggest that there is wide variation in budget estimates with optimism and pessimism both represented.

When such budget estimates are aggregated the overall estimate may be close to its expected value (if optimism and pessimism act so as to cancel each other out), but this is largely accidental. If the aggregate budget is in need of amendment, uniform treatment of all units produces unequal results as shown in Figure 3.

Although the optimistic budget now becomes easier to achieve the pessimistic budget is reduced even further. Presumably what is required is an amendment which brings both figures closer to the mean value. This result is unlikely to be achieved by any budgetary technique, but requires the individual consideration of each budget submission by an experienced and well-informed superior. The essential point still holds, namely that rules of thumb can produce effects which differ from unit to unit because they ignore rather than illuminate the underlying issues.

Our conclusion is therefore that the techniques of budgetary manipulation and aggregation should be adjusted to meet the needs of the budgetary process, rather than imposing arbitrary rules of thumb which distort the underlying processes. In particular, if it is accepted that budget estimates may legitimately be set at levels that represent other than expected outcomes, possibly because the underlying distributions are skew, then more sophisticated means of aggregation than simple addition are required. In some cases it may be that arithmetic tidiness should be sacrificed in order to preserve other features of the budgetary process, and that we need to learn to live with budgets that don't add up.

Conclusions

It has been shown that if budget estimates submitted by unit managers represent anything other than their expectation of average performance over the budget period, then the aggregation of such estimates will produce a figure having a more extreme chance of attainment than the original budget submissions. Slightly biased estimates at unit level rapidly become quite unrealistic estimates when added together in sufficient numbers.

Common methods of dealing with this effect on an intuitive basis, such as proportional changes in units' budget submissions, have two effects. Firstly, they may cause inequities between individual units. Secondly, even equitable methods of budget amendment still cause a different chance of attainment between unit and aggregate budgets. A method of dealing with the first problem is proposed, although it requires information that is unlikely to be easily available, and may also cause motivational problems. However, it does not affect the second problem which is a consequence of insisting that budget figures should add up arithmetically into an overall aggregate budget.

It is our contention that arithmetic additivity is an inappropriate requirement for budgets which represent anything other than a statistical expectation. As there are strong arguments to suggest that many budgets legitimately differ from statistical expectations, insisting on arithmetic additivity is likely to produce a variety of undesirable side-effects. The budget process should therefore be tailored to fit the characteristics of the situation in which it is to work and estimates should be adjusted to give the desired chances of attainment at each level. If the situation requires non-mean budget estimates then these should be used, but the aggregation of such estimates is a more complex process than simple addition, and requires the application of a certain amount of statistical expertise. Thus when combining budget estimates, perhaps the figures shouldn't always add up!

Accounting for Deferred Tax on Depreciable Assets

Peter L. Watson

1. Introduction

SSAP 15 'Accounting for deferred taxation' makes revisions to SSAP 11 by permitting companies to opt out of accounting for deferred taxation in situations where '... originating timing differences of material amount... can be demonstrated with reasonable probability to continue in the future.'[1] This article examines the problem of accounting for deferred taxation where timing differences arise from 'the availability of tax allowances in taxation computations which are in excess of the related depreciation charges in financial statements...'.[2] The remainder of this article is divided into three parts. Part 2 outlines the different methods of accounting for deferred taxation on timing differences and summarises the arguments which have been used to support each method. Part 3 demonstrates that, where there are no changes in price levels and using historic cost accounting methods, a 'correct'[3] assessment of the future liability for taxation in the balance sheet of a company necessitates full accounting for deferred taxation, even where timing differences are expected to recur indefinitely. The only exception to this rule is when a firm is unable to take full advantage of the available capital allowances at the first possible opportunity. Part 4 outlines conclusions and suggests ways in which the treatment of deferred taxation as defined in SSAP 15 could be improved.

2. Methods of accounting for deferred taxation on depreciation

There are basically three methods which can be used to account for deferred taxation from timing differences in depreciation: (a) the flow through method; (b) the deferral method; and (c) the liability method. The flow through method effectively takes no account of timing differences and shows the tax liability in the accounts each year as the actual legal liability for tax payable on the profits of the year. The deferral method accounts fully each year for the deferred tax from timing differences in depreciation. The amount of deferred tax is computed using the tax rate in force at the date of origin of the timing differences and there is no subsequent adjustment to the deferred tax liability if the tax rate changes. The liability method is similar to the deferral method except that whenever the tax rate changes the balance on the deferred tax account is adjusted to reflect the new tax rate. SSAP 11 permitted the use of either the deferral or the liability method. SSAP 15 does not specifically distinguish which of these two methods is to be used. It will be argued in this paper that the liability method is the more appropriate method under either historic cost or current cost accounting because it results in an accurate assessment of the present burden of the future tax liability for the majority of companies. Only in the case of companies which have to carry forward tax losses or unused capital allowances would the use of the liability method give misleading information about the present burden of the company's future tax liability.

SSAP 15 gives companies the option of switching to the flow through method in situations where timing differences are expected to recur for the foreseeable future. The Accounting Principles Board of the United States in APB11 'Accounting for Income Taxes' describes the situation in which this option is given as 'partial allocation' and the situation where there is no such option as 'comprehensive allocation'. APB11 contains a useful summary of the arguments in favour of both the partial and the comprehensive approaches. The views of those favouring partial allocation are summarised as follows:

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[1] SSAP 11, para. 27.

[2] SSAP 15, para. 6(b).

[3] 'Correct' is used here to mean that it is equal to the 'economic value' of the future liability for taxation. Economic value is defined to mean the present value of the estimated future cash flows. See for example, H. C. Edey, 'The Nature of Profit', *Accounting and Business Research*, Winter 1970, for a development of this line of thinking.

> ...Accounting deals with actual events, and... those who would depart from the fact of the tax payment should show that the modification will increase the usefulness of the reports to management, investors and other users. To do this requires a demonstration that the current lower (or higher) tax payments will result in higher (or lower) cash outflows for taxes within a span of time that is of significant interest to readers of the financial statements.

The views of those favouring comprehensive allocation are summarised as follows:

> Those who support comprehensive allocation believe that the partial concept in stressing cash outlays represents a departure from the accrual basis of accounting. Comprehensive allocation, in their view, results in a more thorough and consistent association in the matching of revenues and expenses, one of the basic processes of income determination.[4]

APB11 concludes in favour of comprehensive interperiod tax allocation and rests its conclusion mainly on the need for matching between pre-tax income and income tax expense. But the arguments for partial and comprehensive allocation are both somewhat inconclusive as they rest on the shaky foundation that 'it is obvious that our view is correct unless those favouring the other view can show it is incorrect'. An argument couched in this form is no more than a statement of position and does not justify or refute the particular viewpoint advocated. The next part of this paper will demonstrate that, given the theory and circumstances here assumed, in all situations except where there is tax loss to be carried forward or where there are capital allowances in excess of taxable profits to be carried forward, comprehensive allocation is appropriate—both on the grounds that there is a 'liability' for deferred tax, whose nature will be defined below, and on the grounds that it gives a more appropriate measure of profit than does the alternative flow through method.

3. Superiority of comprehensive allocation

The arguments of this part will be developed in four distinct stages: first it will be shown that when a tax is imposed on corporate profits it has the effect of reducing the value of the shareholders' equity in the sense that it reduces their expected cash flow; second it will be demonstrated that even in situations where the actual tax liability for a year is zero, for example where capital allowances claimed just equal taxable profits, it is still appropriate to account for deferred tax on timing differences in depreciation, regardless of the length of time for which this timing difference is expected to recur; third it will be shown that where after tax profits are used as the basis for measuring a company's performance, the figure will be more informative if comprehensive allocation is adhered to; and fourth, brief consideration will be given to the exceptions to these results.

It is fundamental to the argument on deferred taxes to remember that when a tax is imposed on corporate profits the direct effect is a reduction in the value of a company to its owners as a result of the reduction in the expected cash flow. This is so obvious as to hardly need stating, but it often seems to be overlooked in arguments concerning deferred tax. The effect of imposing a tax on corporate profits is shown in the following simple example:

Example 1

An ungeared company expects to receive cash from operations of £3,000 at the end of each year for the indefinite future after making any necessary capital investment to maintain the cash flow at that level. If the cost of equity capital to the company is 10%, the value of the company's shares is the present value of a perpetuity that is:

$$\text{value} = £3{,}000/0{\cdot}10 = £30{,}000$$

Suppose now, after the initial investment, that a tax is imposed on corporate profits at a rate of 50% payable at the time of the cash flow[5] and at the same time capital allowances are granted at a rate of 100% on new investments. For simplicity assume also that net current assets are unchanged from year to year so that cash flows are equal to taxable profits. Providing the cost of capital remains unchanged when the tax is imposed,[6] the

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[4] APB11, paras. 28 and 31.

[5] It is a simple matter to allow the tax payment to be made at a later date but this detail is omitted for clarity.

[6] Some change in the cost of capital might be expected but the direction of the change is not determinate and depends on the needs and priorities of investors, on the available investment opportunities, and on the distribution of the proceeds of the tax in the economy. For simplicity such general economic effects are excluded. Personal tax is not explicitly considered; it is assumed that the dividend flow and cost of capital are consistently defined so as to reflect the same rate of personal tax.

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value of the company to its shareholders will fall to:

$$\text{value (after tax)} = £3{,}000\ (0{\cdot}50)/0{\cdot}10 = £15{,}000$$

In the circumstances specified, with a 50% tax rate, the value drops by half. If the capital allowances had been any less generous, the decrease in value would have been greater.

Assume that in example 1 the book value of the company's net assets was £30,000 before the imposition of the tax. There should be, on the basis of the theory of value assumed, an adjustment to recognise the effects of imposing the tax. In this example the imposition of the tax gives the taxing authority a 50% share of any subsequent positive cash flows the company produces, assuming the tax system remains unchanged. This is in the nature of an equity interest as it is paid after all other expenses of the company have been met, though the taxing authority does not have quite the same rights as other equity shareholders.[7] Thus, when a tax on corporate profits is imposed or changed an accurate reflection of the situation would require that an appropriate proportion of shareholders' equity be transferred to an account known perhaps as 'government or tax equity'. In example 1 the appropriate amount is £15,000, which is the present value of future tax payments to be made by the company. It is not a specific liability and is contingent on whether the company actually receives the cash flow in the future. It is thus in the nature of risk capital. Furthermore, in determining a debt equity ratio, it would properly be regarded as part of the equity interest being, where interest payments are allowable for tax purposes, a share of the equity interest paid to the tax authorities only after all other expenses of the company have been met.

Before the situation of recurring timing differences is investigated, it will be helpful to show the effects of taxation on a new investment project.

Example 2

B company has a possible investment project which will result in the following cash flows before tax:

Cash outlay	Cash receipts end of year		
Time 0	1	2	3
£3,000	£1,300	£1,200	£1,100

At a 10% cost of capital gross of tax this project has a zero net present value.[8] If a tax at a rate of 50% were imposed with conditions similar to those in example 1, that is with taxable profit equal to cash receipts and 100% capital allowance in the first year, the after tax cash flows (initial outlay and later cash receipts) would all be 50% of the pre-tax cash flows.[9] As all cash flows are reduced by the same proportion, the net present value is changed by that proportion. Thus a positive net value project will be reduced in value, the size of negative net present values will be reduced but zero net present value projects will be unchanged.[10] For the company, in this example, balance sheets for the project can be prepared under two assumptions: (a) that there is no tax and (b) that a tax is imposed as specified above. They are prepared using straight line depreciation and assuming that any cash flows from the project are used elsewhere in the organisation. The use of straight line depreciation is appropriate for the form of the cash flows, because the resulting book value of the asset in all years is equal to the discounted present values of the remaining cash flows to be received from the project, and is therefore consistent with the valuation model assumed.

(a) *Without tax balance sheets for the project*

End of year	0	1	2	3
Asset cost	3,000	3,000	3,000	3,000
Less depreciation	—	1,000	2,000	3,000
Shareholders' equity in the project	£3,000	£2,000	£1,000	—

(b) *With tax balance sheets for the project*

End of year	0	1	2	3
Asset cost	3,000	3,000	3,000	3,000
Less depreciation	—	1,000	2,000	3,000
	£3,000	£2,000	£1,000	—
Shareholders' equity	1,500	1,000	500	—
Deferred tax	1,500	1,000	500	—
	£3,000	£2,000	£1,000	—

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[7] The taxing authority does not have a vote as other shareholders though it does have the power to change its share in the company unilaterally by changing the tax rate, or the basis of assessment.

[8] $\text{NPV} = -£3{,}000 + £1{,}300/1.1 + £1{,}200/1.1^2 + £1{,}100/1.1^3$
$= -£3{,}000 + £1{,}181.82 + £991.74 + £826.45$
$= £0.01.$

[9] Assuming the company has sufficient taxable profits from other activities to allow capital allowances to be claimed at the first opportunity.

[10] This result holds even when the payment of tax is delayed after the date of the cash flow on the basis of which the tax is calculated. Where the tax law does not incorporate 100% capital allowances in the year of the acquisition of an asset, the simple proportional relationship does not hold and some projects which had positive or zero NPVs before tax will have negative NPVs after tax.

The with tax balance sheet is prepared using the liability method of accounting for deferred tax.

The interpretation of these balance sheets is interesting. At the start of the project the asset cost is equal to the present value of the cash flow because the project has a zero net present value. At the end of year 1 the present value of the remaining cash flows is:

$$\begin{aligned} PV &= £1{,}200/1.1 + £1{,}100/1.1^2 \\ &= £1{,}090.91 + £909.09 = £2{,}000 \end{aligned}$$

At the end of year 2, the present value of the remaining cash flows is:

$$PV = £1{,}100/1.1 = £1{,}000$$

Thus at all times the asset is recorded at its deprival value.[11] As explained above, when the tax specified is imposed at 50%, the taxing authority effectively takes over a 50% proportion of all the cash flows. Thus it pays 50% of the initial cost in the form of the 100% first year allowance and receives 50% of all net cash receipts. This is equivalent to taking a 50% equity interest in the project and this is reflected in the accounting for deferred tax and the amount of the deferred tax account.

It can be seen that with both existing activities and new investments, a correct reflection of the 'tax equity' in the company requires the use of the liability method of accounting for deferred tax. When the tax rate is increased, this also increases the proportionate share of the company's taxable profits reflecting the interest of the taxing authority. Unless there are good reasons for supposing that the tax rate will return to its previous level the value of the tax equity will also change accordingly. This change can be incorporated by recalculating the balance on the tax equity account using the new rate of tax. In the absence of any contradictory evidence the present tax rate is probably the best available estimate of the future rates of tax. This is the essence of the liability method.

The elements of examples 1 and 2 can now be combined in examples which show the effects of recurring time differences. Example 3 shows the 'steady state' or 'static' case,[12] that is a situation where a company has a group of assets and replaces the same number each year so that the total number of assets remains the same.

Example 3

C Company owns 3 assets of the type shown in example 2, one new, one one year old and one two years old. Thus, at the present moment (at the beginning of year 1) with no replacements assumed, the company can expect to receive the following cash flows:

Asset date of purchase	Cash flow end of year 1	2	3	Total present value
−2	1,100	—		
−1	1,200	1,100		
0	1,300	1,200	1,100	
	£3,600	£2,300	£1,100	
Discount factor	$1/1{\cdot}1$	$1/1{\cdot}1^2$	$1.1/1^3$	
Present value	£3,272·73	£1,900·83	£826·44	£6,000

The total present value of the cash flows is equal to the total book values of the assets, namely £3,000 + £2,000 + £1,000 = £6,000.

If a tax is now introduced on the same basis as in the examples above, the taxing authority will effectively take over 50% of the remaining cash flows, that is 50% of the total value of the company or £3,000. It will be shown that if the company adopts the policy of replacing one machine each year, regardless of how long that policy continues, the present value of the 'tax equity' today remains £3,000. This will be shown for two cases: (a) in which the company accounts for deferred tax for new investments only after the new tax is introduced, using the liability method and (b) in which the company also accounts for deferred tax retrospectively on machines owned at the time the tax is imposed.

(a) *Deferred tax accounting for new projects*

Book values of the asset	*Balance sheet at end of year* 1	2	3
Date of purchase of asset			
−1	1,000		
0	2,000	1,000	
1	3,000	2,000	1,000
2	—	3,000	2,000
3	—	—	3,000
Total book values	£6,000	£6,000	£6,000

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[11] Assuming that at each date (i) a replacement is available at the same cost and would give the same cash flows over its life and (ii) scrap value is not greater than the book value thus calculated. These conditions would be met if the markets for capital assets were perfect.

[12] See for example Sydney Davidson, 'Accelerated Depreciation and the Allocation of Income Taxes', *Accounting Review*, April 1958. In that article Davidson produces opposite conclusions to those expressed in this article. But his argument is from the perspective of the income statement, and he does not consider the effects on the balance sheet.

Deferred tax for each asset	*Balance sheet at end of year* 1	2	3
Date of purchase of asset			
−1	—		
0	—	—	
1	1,500	1,000	500
2		1,500	1,000
3			1,500
Total deferred tax	1,500	2,500	3,000
Shareholders' equity	4,500	3,500	3,000
	£6,000	£6,000	£6,000

Profit and loss account	Year 1	2	3	4
Cash flow from assets	3,600	3,600	3,600	3,600
Depreciation	3,000	3,000	3,000	3,000
Profit before tax	600	600	600	600
Less tax payable	300	300	300	300
Deferred tax debit	−1,500	−1,000	−500	—
Profit after tax	−1,200	−700	−200	300
Less dividend	300	300	300	300
Change in shareholders' equity	£−1,500	£−1,000	£−500	—

In subsequent years the profit and loss account remains as in year 4 and the balance sheet remains as at the end of year 3. It can be seen from the profit and loss account that both the annual tax payable and the dividend are perpetuities which have a value of £3,000, each at the company's cost of capital of 10%. The bottom line 'change in shareholders' equity' is different from zero as a result of the transition to full deferred tax accounting following the introduction of corporation tax. The transitional element ceases when the deferred tax account has been built up to the correct level.

(b) *Deferred tax accounting retrospectively for existing projects*

In this case when the tax was imposed £3,000 would be transferred from shareholders' equity to deferred tax. In all subsequent years the profit and loss account would be the same as shown for year 4 above. The balance sheet would show a total asset book value of £6,000 and shareholders' equity and deferred tax of £3,000 each.

A general expression for the total value of the company is

$$£600 \times a_{\overline{n}|.10} + £3{,}600/1.1^{n+1} + £2{,}300/1.1^{n+2} + £1{,}100/1.1^{n+3}$$

where n is the last year the company replaces an asset.

This can be written as:

$$£600\left\{\frac{1-\dfrac{1}{(1.1)^n}}{0.10}\right\} + £6{,}000/1.1^n$$

which simplifies to:

$$£6{,}000\left[1-\frac{1}{(1.1)^n}+\frac{1}{(1.1)^n}\right]$$

and this is clearly equal to £6,000 whatever the value of n. Appendix A gives a more general algebraic presentation of this result. Thus whenever the company chooses to stop replacing its assets and to wind up its operations, the present value of the company's cash flows is £6,000. As the taxing authority has an interest in half of all the cash flows, the deferred tax or tax equity is therefore £3,000. The main difference between accounting for deferred tax on new projects only and accounting retrospectively occurs during the transition period between the initial imposition of the tax and the time that all the company's assets are accounted for deferred tax. When the tax is imposed and deferred tax accounting is first introduced for new assets only, the effect is to depress reported profits for the length of the transition period as can be seen in the profit and loss accounts of example 3. This apparent slump in profits could be avoided by applying the liability method of accounting for deferred taxation retrospectively to existing assets at the time the tax is first imposed, by means of a transfer from reserves.[13]

If the company decides to adopt a policy of growth, that is to invest each year more than the amount needed to keep the expected cash receipts constant, a similar situation will arise, except that, as the company grows, the value of the shareholders' equity will increase and the amount of the deferred tax, which is proportionately related to the shareholders' equity, will increase correspondingly. This is shown in example 4 which is the extreme case where all cash flows are invested each year.

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[13] If the liability method were interpreted literally, the introduction of a new tax could be seen as a change in the tax from zero to 50%.

Example 4

The same figures as before are used except that all cash flows are reinvested. The cash flows generated by the assets will be as in Table 1 assuming that the company can change the scale of its investments and that any change in scale will affect all cash flows in the same proportion and leave the cost of capital unchanged.

In this case, as the cash flows are reinvested, the present value of the future cash flows to be received increases correspondingly. So although no dividend is paid for several years, the firm's value grows at a constant annual rate of 10% which is determined by the fact that the firm's net income before tax is 10% of the opening asset value. As it is assumed that the firm will eventually have to pay 50% of all net cash receipts to the taxing authority two things follow: first the amount of the deferred tax account will be the same as the shareholders' equity and second the tax equity will grow at the same rate as the shareholders' equity. This relationship will hold regardless of how long the firm continues to grow before it pays a dividend, providing the present tax arrangements continue.

It can be shown that accounting for deferred

Table 1

	Cash flows—end of year					
Asset purchased	1	2	3	4	5	6
−2	1,100·00					
−1	1,200·00	1,100·00				
0	1,300·00	1,200·00	1,100·00			
1	−3,600·00	1,560·00	1,440·00	1,320·00		
2		−3,860·00	1,672·67	1,544·00	1,415·33	
3			−4,212·67	1,825·49	1,685·07	1,544·65
4				−4,689·49	2,032·11	1,875·80
5					−5,132·51	2,224·09
6						−5,644·54
Net cash flow	0	0	0	0	0	0
Book value of assets	*Balance sheets—end of year*					
Asset purchased	1	2	3	4	5	6
−1	1,000·00					
0	2,000·00	1,000·00				
1	3,600·00	2,400·00	1,200·00			
2		3,860·00	2,573·33	1,286·67		
3			4,212·67	2,808·45	1,404·22	
4				4,689·49	3,126·33	1,563·16
5					5,132·51	3,421·67
6						5,644·54
	6,600·00	7,260·00	7986·00	8784·61	9663·06	10,629·37
Shareholders' equity	3,300·00	3,630·00	3.993·00	4,392·31	4,831·53	5,314·69
Deferred tax	3,300·00	3,630·00	3,993·00	4,392·30	4,831·53	5,314·68
	6,600·00	7,260·00	7986·00	8,784·61	9,663·06	10,629·37
Profit and loss account	*For the years*					
	1	2	3	4	5	6
	£	£	£	£	£	£
Cash receipt	3,600·00	3,860·00	4,212·67	4,689·49	5,132·51	5,644·54
Depreciation	3,000·00	3,200·00	3,486·67	3,890·89	4,254·05	4,678·22
	600·00	660·00	726·00	798·60	878·46	966·32
Less deferred tax	300·00	330·00	363·00	399·30	439·23	483·16
Net increase in shareholders' equity	300·00	330·00	363·00	399·30	439·23	483·16

tax results in an informative measure of performance both before and after tax. The investment shown in example 2 yields an economic return of 10% both before and after tax. Where there is full accounting for deferred taxation, inspection of the ratios of pre-tax profits to shareholders' equity plus tax equity and of post-tax profits to shareholders' equity in examples 3 and 4 show a return on capital of 10% in all cases. This accurately reflects the economic returns on the company's investments.[14] In the absence of accounting for deferred tax, the ratio of post-tax profits to shareholders' equity in example 3 for year 4 and after shows a return of 5% which understates the economic return from the shareholders' investment which is 10%. In example 4 the ratio of pre-tax profit to shareholders' equity would be 10% in the absence of a deferred tax account but the figures presented in this way fail to inform shareholders of the share of eventual cash flows which would have to be paid to the tax authorities and of the consequent over-valuation of the shareholders' equity.

Where there are tax losses or capital allowances in excess of taxable profits, the situation immediately becomes more complex. It is beyond the scope of this article to cover the problem in anything more than outline as the multiplicity of possible circumstances faced by different firms is such that a general treatment would be unrealistic. It is necessary to distinguish the situation of a taxable loss from one in which there are excess capital allowances which have to be carried forward. Where there is simply a taxable loss and no capital allowances are involved, the treatment of any existing deferred tax depends on the tax laws and their impact on the particular company. Where it is possible to carry back the loss and claim repayment of tax on previous years' profits, the taxing authority effectively takes an immediate share in part of the loss and this will be reflected in the year's profit and loss account. There should be no change in the deferred tax account unless the loss has to be carried forward to be set against future years' profits. Where taxable losses are carried forward the deferred tax account should be suitably reduced.

The situation where excess capital allowances have to be carried forward is rather more interesting. If, as a result of a large tax loss, there is no prospect in the foreseeable future that the company will be able to utilise all of its capital allowances, there should presumably be no accounting for deferred tax as the present value of any prospective tax payments will be close to zero. However, in any year a company will not normally invest more than it can offset in capital allowances unless it has projects with large positive net present values. This is shown in example 5 which shows the effects of adding additional investments to example 4.

Example 5

If an additional investment is carried out at the beginning of year 1 with before tax cash flows as in example 2, the effects on pre- and post-tax cash flows will be as follows:[15]

	Cash flow end of year			
	0	1	2	3
Before tax	−3,000	1,300	1,200	1,100
Tax	—	—	—	300
After tax	−£3,000	£1,300	£1,200	£800

This incremental investment clearly has a negative net present value if the cost of capital is 10% as all the cash flows after tax are the same as those before tax with the exception of the cash flow at the end of year three which is smaller after tax. There is an interesting sidenote here for tax policy in that the project would be worthwhile either for companies with a sufficiently large offsetting tax liability available, or for companies whose previous losses are so large as to rule out any reasonable expectation of their ever having to pay tax again. Companies which were in a period of recovery following modest tax losses or excess capital allowances carried forward, would be better off not investing in the project. The present tax system appears to be biased against companies in this type of situation. As the before tax cash flows have a zero NPV, the after tax cash flows must have a negative NPV. Thus a firm would not voluntarily undertake additional investment projects which would result in excess capital allowances to be carried forward, unless the marginal project had a large enough positive net present value before tax to offset the reduction in NPV as a result of the loss of the 100% first year allowance.[16]

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[14] In general this result only holds exactly if the depreciation method used is appropriate for the cash flows of the asset and the project has a zero net present value.

[15] In example 4 the taxable profit for years 0 to 3 is zero. The tax payable in respect of the new project is based on the assumption that 100% free depreciation is claimed when the investment is made and is carried forward to be offset against cash flows as soon as possible. Thus £1,300 and £1,200 would be offset in years 1 and 2. The remaining £500 is offset in year 3 leaving a taxable profit of £600 on which tax at 50% amounts to £300.

4. Conclusion

This article has shown that, on the basis of the assumptions made initially, it is appropriate to account for deferred tax in all cases where capital allowances are available in excess of the related depreciation charges in accounts, except those where a company has losses or excess capital allowances to be carried forward. This is a significantly narrower class of exceptions as compared with those permitted in SSAP 15 which specifies that if '(a) the directors are able to foresee on reasonable evidence that no liability is likely to arise as a result of the reversal of timing differences for some considerable period (at least three years) ahead; and (b) there is no indication that after this period the situation is likely to change so as to crystallise the liabilities', there is no need to account for deferred tax. The article specifically shows that the deferred tax 'liability' or 'tax equity' is unaffected by the length of the period for which the timing differences are expected to recur or indeed by the fact that the company is investing the whole of its taxable income in projects which qualify for 100% first year tax allowances.

Although the assumptions made in this article will not hold in practice, it is suggested that they provide the best available model for examining the logic of deferred tax, and that variations from the ideal situation discussed will not invalidate the general conclusion. For example, it is not difficult to see that the arguments could be extended to cope with changing price levels. To be consistent with the model, suitably adapted to allow for changing prices, all companies whose taxable profits equalled or exceeded available capital allowances would have to account for deferred tax. In addition all revaluation surpluses should be credited to both shareholders' equity and deferred tax accounts in proportions determined by the rate of tax on company profits. However, detailed demonstration of the correctness of this rule where prices are changing is made more difficult by the differences of opinion which surround the methods of accounting for changing price levels and so is held over for a further article on the subject.

In practice the number of companies whose taxable losses or excess capital allowances are of such a size as to rule out the possibility of paying any tax in the foreseeable future is presumably relatively small. Only a nationalised industry could afford to trade indefinitely on this sort of basis, and for most companies the tax loss would probably be fairly rapidly offset because the mere fact of having taxable losses would tend to act as a disincentive against significant capital investment for the reasons advanced earlier in this article. For those companies which do have taxable losses or excess capital allowances to be carried forward, the deferred tax liability should be suitably discounted from the date at which the losses and excess capital allowances are fully offset against subsequent taxable profits. The length of this period will vary from company to company, and it is probably a practical necessity for standard accounting practice to allow firms to opt out of deferred tax accounting when the period before the tax losses and excess capital allowances will have been completely offset is a long one. It would seem sensible to place a specific limit on the period.

It was argued above that the deferred tax account in the balance sheet created by accounting for timing differences in depreciation is closely akin to an equity interest in the company because it represents a share of future profits which the taxing authorities will receive only if there are future profits and only after all expenses which are allowable for tax purposes have been deducted. This classification of deferred tax as something similar to owners' equity is important for two reasons. First, it makes it difficult to argue that such a liability should not be accounted for because its ultimate realisation is contingent and remote. Tax equity resulting from timing differences is proportionate[18] to shareholders' equity in the relevant capital investment and to argue that no tax liability is foreseeable is effectively to argue that there is no equity value. If the shareholders' equity has some value, so also does the tax equity. Second, in interpreting the accounts, particularly in determining of gearing or leverage, the deferred tax liability is properly added to shareholders' equity because where debt interest is allowed for tax purposes, debt interest is effectively a payment which will be made prior to the tax payments. Gearing or leverage ratios are in essence ratios of prior payments to the residual interest in the company's income.

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[16] It can be shown that if the firm took on each year a new project of the same type as is used in example 2, the total negative net present value would become larger at a progressively slower rate. Eventually the firm reaches a new steady state and its taxable profits exceed capital allowances. The present value of the tax burden approaches a limiting value as the chain of asset purchases is extended indefinitely. But shareholders would be better off if the firm carried out none of these investments.

[17] SSAP 15, para. 28.

[18] Under the system of taxation assumed in this article. This system is substantially the same as the system presently in force in the United Kingdom. There is, however, a major difference in the tax allowances available for industrial and commercial buildings.

A final note of reassurance is perhaps necessary for those who believe that a future government looking at the 'deferred tax' in companies' accounts might argue that if the deferred tax was a type of government equity in the company, they, the government, should be issued with shares to the value of the deferred tax account. In economic terms, the *quid pro quo* of such an arrangement would be for the government to abolish the corporation tax because the deferred tax account is essentially an estimate of the present value of all future payments of corporation tax.

Appendix A

Algebraic proof that the deferred tax liability of a steady state company is unaffected by the length of time for which timing differences recur.

(a) *Definitions*

The company has m machines, the costs and revenues of each of which, including the initial investment, can be expressed as a stream of expected and actual before tax cash flows of A_0, $A_1 \ldots A_m$ (i.e. prices and technology remain constant over time) and it replaces one machine each year.

At the company's cost of capital, r, each machine gives a zero net present value that is:

$$\sum_{t=0}^{m} A_t(1+r)^{-t} = 0$$

The company is taxed at a rate of corporation tax C_t. In each and every year the taxable profit is equal to the sum of the cash receipts from the company's machines. The company can claim 100% of the cost of the asset as a capital allowance in the year in which the machine is purchased and it invariably does so. Tax is payable on the last day of the accounting year.

(b) *Value of the company today (at the start of year 1)*

The company owns m assets, one new (purchased on the last day of the year just ended), one one year old and so on. The total cash flows expected by the company from the machines presently owned (assuming there is no surplus cash in the company today) may be built up as follows:

Before tax cash flow
at end of year

$$\begin{array}{lccccc}
\text{Age of machine} & 1 & 2 & 3 & m-1 & m \\
0 & A_1 & A_2 & \cdots & A_{m-1} & A_m \\
1 & A_2 & A_3 & \cdots & A_m & \\
\vdots & \vdots & & & \diagup & \\
m-2 & A_{m-1} & A_m & & & \\
m-1 & A_m & & & &
\end{array}$$

If these cash flows are discounted at the company's cost of capital r, the value of the company can be found to be

$$V_0 = \left[(1+r)^{-1}\sum_{t=1}^{m} A_t\right] + (1+r)^{-2}\left[\sum_{t=2}^{m} A_t\right] + \ldots + [(1+r)^{-m}A_m] \qquad (1)$$

Multiplying both sides of (1) by $(1 + r)$ gives

$$V_0(1+r) = \sum_{t=1}^{m} A_t + \left[(1+r)^{-1}\sum_{t=2}^{m} A_t\right] + \ldots + [(1+r)^{-m+1}A_m] \qquad (2)$$

Subtracting (1) from (2) gives

$$V_0(1+r) - V_0 = \sum_{t=1}^{m} A_t - (1+r)^{-1}A_1 - (1+r)^{-2}A_2 - \ldots - (1+r)^{-m}A_m \qquad (3)$$

Because the machines have a zero net present value:

$$A_0 = -(1+r)^{-1}A_1 - (1+r)^{-2}A_2 - \ldots - (1+r)^{-m}A_m \qquad (4)$$

Substituting into (3) and simplifying:

$$V_0 r = \left(\sum_{t=1}^{m} A_t\right) + A_0$$

$$V_0 r = \sum_{t=0}^{m} A_t$$

$$V_0 = \sum_{t=0}^{m} A_t/r \qquad (5)$$

Equation (5) may be interpreted as saying that the value of the firm is equal to the present value of the perpetuity which would be obtained if the firm were to continue in its steady state indefinitely. In this case the annual cash flow would be

$$\sum_{t=0}^{m} A_t$$

in perpetuity. It therefore has the same value whether or not it continues in the steady state indefinitely.

Equation (5) effectively proves the proposition stated at the start of this appendix. To establish this, suppose the firm stays in a steady state for n periods and then stops replacing its assets. The value of such a firm would be:

$$V_0^* = a_{\overline{n}|r} \sum_{t=0}^{m} A_t + (1 + r)^{-(n+1)} \sum_{t=1}^{m} A_t + \dots + (1 + r)^{-(n+m)} A_m \qquad (6)$$

This can be simplified as follows:

$$V_0^* = a_{\overline{n}|r} \sum_{t=0}^{m} A_t + (1 + r)^{-n} \left[(1 + r)^{-1} \sum_{t=1}^{m} A_t + (1 + r)^{-2} \sum_{t=2}^{m} A_t + \cdots + (1 + r)^{-m} A_m \right]$$

Using (1) and (5) the terms in the square brackets equal

$$\sum_{t=0}^{m} A_t / r$$

giving

$$V_0^* = a_{\overline{n}|r} \sum_{t=0}^{m} A_t + (1 + r)^{-n} \sum_{t=0}^{m} A_t / r$$

Using

$$a_{\overline{n}|r} = \frac{1 - (1 + r)^{-n}}{r}$$

gives

$$V_0^* = \frac{1 - (1 + r)^{-n}}{r} \sum_{t=0}^{m} A_t + (1 + r)^{-n} \sum_{t=0}^{m} A_t / r$$

Which simplifies to

$$V_0^* = \sum_{t=0}^{m} A_t / r$$

Which is the same as equation (5). Thus the value of the company is unaffected by the length of the period for which the timing differences recur.

V_0^* is a before tax value. Because the tax system is such that the tax is a constant proportion of all cash flows this value can be broken down into two components

(i) Deferred tax or tax equity $= C_t \sum_{t=0}^{m} A_t / r$

(ii) Shareholder equity $= (1 - C_t) \sum_{t=0}^{m} A_t / r$

As the value of the company is unaffected by the period for which timing differences recur, so also is the deferred tax.

Book Reviews

The Evolution of Economic Ideas. *Phyllis Deane.* Cambridge University Press, 1978; xv + 236 pp. £9.50 hardback; £3.95 paperback.

Miss Deane's study of the evolution of economic ideas will commend itself to accounting historians. She distinguishes two approaches. The first is to study the logical sequence of change in theories, concepts and analytical techniques. The second is to trace the historical process of change by the way in which successive generations have adapted their explanatory techniques to the solution of problems that they regarded as both important and soluble. The two approaches are not mutually exclusive. They overlap, but raise different sets of questions. Miss Deane concentrates on the second approach, but recognises the problems of specifying the 'relevant economic consensus, the analytical framework which a given generation accepts as authoritative'. She suggests that shifts in economists' views about *what* they ought to be solving, as well as *how* they ought to be solving them, are the key to understanding the historical changes that have taken place in the analytical framework of economics:

> It may be that changes in the doctrines which practising economists regard as orthodox are more often the result of autonomous change in the problem situation, leading to changes in the form of explanation, than of objective research designed to test the logical or empirical validity of existing theory (p. xiii).

Accountants, lacking an 'existing theory', have inevitably been forced back even more firmly into reacting to 'autonomous changes' in 'problem situations'. Attempts at solving them have encouraged some excursions into the theories of other disciplines, especially economics. However, the subject matter of accounting may, to a degree, be delineated and identified by the problems it seeks to solve. The practice of external reporting has long relied on such conventions as conservatism, objectivity, and historical cost, largely in response to problems created by subjectively optimistic reporting. Although this basis has been challenged on theoretical (largely economic) grounds, the major impetus for change has come from a recognition of the problems raised by recent high rates of inflation, and attention has increasingly been directed towards the purposes of external reporting.

It is as well to remind ourselves that economists, too, have found inflation a problem. For example, Smith recognised inflation and distinguished between 'real' price and 'nominal' price, which varied according to the varying values of the numeraire. Ricardo neatly avoided inflation by expressing his 'cost of production' theory of value in real terms and by assuming that the value of gold did not change. Orthodox Keynesians see inflation as a trade-off against unemployment, and have largely ignored the problem by assuming stable prices.

Miss Deane concentrates on three branches of economics, value, growth and money, and does not attempt to provide a complete account of any one branch, nor to identify all those who have made a major contribution. Rather, her intention is to

> illustrate the way economists' views on the scope and methodology of their discipline—and hence the assumptions and questions underlying their theories—have been subject to a variety of intellectual, historical and ideological influences (p. xv).

The subject of 'accounting' receives no mention in the index. This is not entirely surprising in a book about economic ideas, although it does epitomise the longstanding lack of contact between economists and accountants. Accountants have, on occasion, adapted and used ideas and analytical frameworks constructed by economists. That these ideas and analytical frameworks have sometimes been misused by accountants may partly be attributed to a lack of interest shown by economists in the problems faced by accountants. It may also be attributed to a failure by accountants both to interest themselves in the writings of economists and to stimulate the interest and concern of economists.

Thus, in the late nineteenth century, when accountants were increasingly adopting 'valuation' conventions of conservatism, objectivity and historical cost, Jevons was writing:

> A student of Economics has no hope of ever being clear and correct in his ideas of the science if he thinks of value as at all a *thing* or an *object*, or even as anything which lies in a thing or an object. Persons are thus led to speak of such a nonentity as *intrinsic value* (p. 72 of the Pelican edition).

It was Marshall who moved the theory away from 'value' towards 'price' and who developed the theory into an 'extensive framework of analysis', which continues to be widely used. Miss Deane observes that it was Marshall who subsequently developed such ideas into an 'extensive framework of analysis':

> Whereas the classical school, obsessed by the problem of defining 'natural' price, or long-term equilibrium supply price, had fallen back exclusively on a cost-of-production theory, and whereas Jevons had swung in the opposite direction and asserted dogmatically that 'value depends entirely on utility', Marshall produced a theory which took both aspects into account simultaneously... Starting from analogous assumptions of utility maximisation for the consumer and profit maximisation for the producer he constructed interdependent theories of (a) demand, based on marginal [and cardinal] utility analysis, and (b) production, based on marginal productivity analysis (p. 117).

However, the introduction of uncertainty and expectations into the analysis, as propounded by Keynes, resulted in

> a world in perpetual disequilibrium, and the neo-classical concept of a self-regulating system becomes irrelevant (p. 223).

The very richness of the history of economic ideas creates its own problems when there is pressure for a more effective analytical framework to deal with current problems. Miss Deane's observations could well be applied to the current state of accounting:

> What is necessary to achieve a revolution in economic ideas, is to convince the conventionally-trained economist that the new disciplinary matrix not only solves the newly-important problems, but also deals with the old more elegantly and effectively than the existing matrix. The new heresy has to build up an impressive stock of practical research achievements to its credit before it will dislodge the grip of the prevailing orthodoxy, and it is useless to reiterate that the latter fails to provide a meaningful answer to the really significant problems... As far as the professional economist is concerned, his vested interest in preserving as much as possible of the hard-won technical skills in which he had been trained, makes it likely that the new paradigm will involve a marriage between schools rather than a total rejection of any one' (p. 225).

In explaining the changing nature of the problems perceived by economists and the ways in which they approached solutions, Miss Deane has performed a very useful function. It is a pity that her book could not include more on such matters as cost concepts, the problems of quantifying some of the data used by economists, and the gradual development of relationships between economics and other social sciences. Let us hope that these will be discussed in a later book.

It is perhaps unfair to end this review on a note of mild and not entirely frivolous criticism. Accountants have over many centuries raised the status of the words 'debit' and 'credit' to an integral part of their professional mystique. It is a pity that Miss Deane should choose to misuse them (pp. 120–1) in an unfortunately popular way, by taking a credit to mean 'a good thing' and a debit to mean 'a bad thing'.

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John Freear

Three Centuries of Accounting in Massachusetts. *William Holmes, Linda H. Kistler, and Louis S. Corsini.* Arno Press, New York, 1978. 256 pp. + appendices. $20.

Accountants with a taste for history owe a big debt to Professor Richard Brief, who fathered the Arno Press collection on the development of accounting thought. These books can, thanks to a photographic process, give us material that might otherwise lie forgotten. Happily Professor Brief's enthusiasm and detective flair remain unabated, and we are promised many more issues.

This volume on accounting in Massachusetts is, however, not made up of reprints but of fifteen new articles, by six authors. The photographic reproduction of their scripts, and of various old accounts and pictures, is excellent. Presumably this brave new process rules out proof-readers; spelling, punctuation, and dates show a cheerful disregard of the norm.

The book is divided into two parts. The first deals with colonial times and the early 1800s; the second is a history of the Massachusetts Society of CPAs. The first has case studies that illumine accounting's development, and so is of general interest; the second traces the growth of a local body, and so may have a rather specialised appeal.

The Massachusetts Society seems very young. Boston became a business centre of some importance in colonial times; yet only a handful of accountants were advertising their services in the first half of the nineteenth century, and about 1850 their number shrank to almost zero. America had no law that made company audits mandatory, and income tax became constitutional only in 1913. The Massachusetts state legislature passed a registration act in 1909, and the first CPA certificate was issued next year. Examinations started in 1912. The society encouraged the formation of a national body; the American Institute was founded in 1936 (and the Massachusetts members booked two Pullmans to attend the annual meeting).

If Massachusetts had few public accountants, it never lacked teachers. In 1667, Boston gave one Will Howard liberty 'to keep a wrighting school, to teach children to write and to keep accounts'. In the eighteenth century, many teachers advertised their skill with merchants' accounts, along with vulgar and decimal arithmetic, navigation, astronomy, and other sister-subjects. Harvard began to teach accounting in 1900—at first in the economics department, and at the Business School when this was set up in 1908.

The case studies of Part I throw light on both social and accounting history. One chapter is on the 'sorrowful tryalls' of the Salem witches in 1692. The accused were kept shivering in Boston jail throughout the winter, and the jailer's accounts have survived. He claimed 2s. 6d. a week for each prisoner, plus the cost of chains, shackles, and locks; the province did not pay till four years later, when he submitted a petition pointing out that his disbursements 'hath greatly lessened and impaired his estate'. A witch's descendants were still trying to get her conviction reversed in 1957.

Another chapter illustrates early municipal accounting—of Plymouth colony. Accounts existed from 1657 onwards. By 1690, budgets and accounts were surprisingly well-organised (and see also the article by the author, Mr. William Holmes, in *The Accounting Review* of January 1979). Fines contributed a good deal of the revenue, e.g. £5 for fornication.

The accounts show how much the colonists depended on barter. An elaborate joint-venture ledger is kept almost entirely in lbs. of sugar. The government collected taxes in commodities, e.g. one-third in pork, one-third in butter, and one-third in tar; each commodity was priced officially, at so much per lb., in units of the almost non-existent local currency.

The public records contain many references to auditors—usually committees of 'select meete persons'. On occasion, they inspected assets bought (e.g. a new building for Harvard). A favourite formula for their report was 'this is a trew account, errors excepted'. When the London shareholders shipped an auditor out to the Pilgrims in 1630, they wrote of him in words that should warm the hearts of all other auditors—a comfort, a joy, and a great stay to the business. But alas he proved a rogue.

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